DOCUMENT RESUME

ED 249 991 IR 050 859

TITLE	Public Services in Research Libraries. Preliminary Reports from the Public Services Research Projects: University of Arizona, Cornell University, University of Illinois, Michigan State University, New York University, Pennsylvania State University, and Texas A & M University.
INSTITUTION	Association of Research Libraries, Washington, D.C. Office of Management Studies.
SPONS AGENCY	General Electric Foundation, Ossining, N.Y.
PUB DATE	Sep 84
NOTE	73p.; Two of the papers may be marginally legible due to broken print.
AVAILABLE FROM	Association of Research Libraries, Office of Management Studies, 1527 New Hampshire Ave., NW, Washington, DC 20036 ($15.00 per copy).
PUB TYPE	Collected Works - General (020) -- Reports - Research/Technical (143)
EDRS PRICE	MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	College Faculty; College Libraries; College Students; Higher Education; *Information Needs; *Information Retrieval; *Library Automation; *Library Catalogs; Library Personnel; Library Research; *Library Services; Library Surveys; *Online Systems; Research Libraries
IDENTIFIERS	Association of Research Libraries; *Online Catalogs

ABSTRACT

Preliminary reports from seven Association of Research Library (ARL) members conducting research on current public services concerns describe progress to date and initial findings. Research grants of up to $4,000 were provided for the projects, which were selected in part because of their potential usefulness to academic and research libraries. The projects include the integration of online catalogs into public services, identification of the unique instructional and research needs of students and faculty in particular disciplines, and the impact of technology on both library users and staff members. Surveys were used for six of the projects. The seventh is a comparison of two end-user operated search systems (BRS and Dialog). Final reports containing complete results will be published after the projects conclude in late 1984. (THC)

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PRELIMINARY REPORTS FROM THE PUBLIC SERVICES RESEARCH PROJECTS

University of Arizona
Cornell University
University of Illinois
Michigan State University
New York University
Pennsylvania State University
Texas A & M University

Project sponsored by the General Electric Foundation

Office of Management Studies
Association of Research Libraries
Washington, D.C.
September, 1984

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Public Services in Research Libraries
Research Projects

Seven Association of Research Libraries (ARL) members are conducting research on current public services concerns, as part of a Public Services in Research Libraries Project sponsored by the General Electric Foundation and operated by ARL's Office of Management Studies.

Research grants of up to $4,000 were provided for the projects, which were selected in part because of their potential usefulness to academic and research libraries. The subjects include the integration of online catalogs into public services, identification of the unique instructional and research needs of students and faculty in particular disciplines, and the impact of technology on both library users and staff members.

These preliminary reports describe progress to date and initial findings from each project. Several of the reports were adapted from presentations at the June 1984 American Library Association conference, at programs of the ACRL Science and Technology Section (organized by Jan Olsen, Cornell University), and the Resources and Technical Services Division. Final reports containing complete results will be published after the projects conclude in late 1984.

The Public Services in Research Libraries Project is financed by a $250,000 two-year grant from the General Electric Foundation. The support, which ends in December 1984, has enabled the Office of Management Studies to develop a series of aids that academic and research libraries can use to analyze, improve, and adapt their public services programs to changing economic, technological, and user needs. The aids include an assisted self-study process and training activities to benefit public services staff.

Prepared by OMS staff
August 1984

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PRELIMINARY REPORTS FROM THE PUBLIC SERVICES RESEARCH PROJECTS

TABLE OF CONTENTS

ONLINE CATALOGS

New York University Libraries
A STUDY OF AN ONLINE CATALOG FROM A PUBLIC SERVICES PERSPECTIVE
Nancy C. Kranich, Project Director
Christina Spellman, Gail Persky
Deborah Hecht

Pennsylvania State University Libraries
THE EFFECT OF AN INSTRUCTION PROGRAM ON ONLINE CATALOG USERS
Mary Ellen Larson, Project Director
Dace Freivalds

SCIENCE INFORMATION NEEDS

University of Arizona
ASSESSING THE INSTRUCTIONAL NEEDS OF STUDENTS
IN A SELECTED SCIENTIFIC DISCIPLINE
Louise Greenfield, Project Director
Jeanne Pfander, Chris Sherratt
Karen Williams

Cornell University Libraries
INFORMATION RESOURCES IN AGRICULTURAL RESEARCH
Joan K. Lippincott, Project Director
Jan Kennedy Olsen, Director, Albert R. Mann Library
Bill Coons, Project Manager

USER STUDIES

University of Illinois at Urbana-Champaign
THE INVISIBLE USER: USER NEEDS IN AN ELECTRONIC ENVIRONMENT
Patricia McCandless, Project Director
Barton M. Clark, Nancy Allen, David F. Kohl,
Dee Wallace, Lucille Wert

Michigan State University Libraries
NON-USERS OF THE MSU LIBRARIES: AN ASSESSMENT OF
CHARACTERISTICS, PERCEPTIONS, AND NEEDS
Terry Link, Project Director
Kriss Ostrom, Agnes Haigh

Texas A & M University
A COMPARISON OF TWO END USER OPERATED SEARCH SYSTEMS
Charles Gilreath, Project Director
Jane Dodd, Geraldine Hutchins

A STUDY OF AN ONLINE CATALOG FROM A PUBLIC SERVICES PERSPECTIVE
New York University Libraries

Nancy C. Kranich, Principal Investigator
Christina Spellman
Gail Persky
Deborah Hecht

Abstract

New York University Libraries received a one-year grant from the Association of Research Libraries to study users' responses to its recently installed Geac online catalog. The survey instrument developed for the Council on Library Resources-funded national study of responses to public access catalogs was used to gather data from 1,000 online catalog users and 500 non-users. The results of the study indicate a high acceptance of the online catalog and also provide an extensive profile of library users. Compared and contrasted with another study conducted simultaneously at NYU, the findings suggest that users express a high degree of satisfaction in using the online catalog regardless of the degree of actual success with locating an item in the catalog.

In September 1983, New York University's Bobst Library commenced an evaluation of its online catalog funded by the Association of Research Libraries (ARL) through a grant from the General Electric Foundation. The study used the questionnaires designed for the Council on Library Resources (CLR)-sponsored national survey of users and non-users of online public access catalogs. The CLR study model allowed NYU to assess users' attitudes toward the newly installed online catalog and compare responses to those at 29 other libraries that participated in the earlier survey project.

The ARL project was one part of a broader program to analyze the effectiveness of the local catalog, affectionately named Bobcat. Other components of the research task included a review of user statistics throughout the library including those taken directly from the computer (ongoing) and an exploration of users' actual success in using the catalog relative to the satisfaction levels they indicated on the CLR survey instruments (a grant funded by the Council on Library Resources and scheduled for completion August 1984). The combined research projects were structured as follows:

1. Replication of the CLR online catalog study questioning users and nonusers according to the procedures outlined in the earlier study;

2. Addition of supplemental questions on the CLR instrument to determine users' perception of success;

3. Design and implementation of a study compatible with the CLR questionnaire but which focused on the actual search conducted by type and retrieval results. This search tracking was carried out in two phases: the first was a self-administered skip questionnaire completed by the user after finishing a

search. This incorporated many questions from the CLR questionnaire; the second was a more in-depth interview in which a librarian went through the search with the person and then asked questions regarding success.

Combined, the various phases of the catalog evaluation project were designed to provide insight into patterns of use and to elicit suggestions for system components requiring improvement. They also were expected to highlight the relationship between users' fascination with the new technology and its success in providing various levels of bibliographic information. Card catalog users were included in the study so that characteristics of online catalog searches could be distinguished from searches in general because it was important to determine if catalog use problems were attributed to the medium or to the inherent structure of all types of library catalogs. Based on earlier CLR catalog study findings which dealt with a number of catalogs in various stages of imperfection, it was expected that in spite of the developmental mode of the NYU Geac catalog, users would overwhelmingly favor the online catalog, regardless of its utility. Given that many of the catalogs' data bases including NYU's were incomplete, representing only a portion of a library's total holdings, it was feared that many users were not double checking in the card catalog and, therefore, were not successfully locating the materials they needed. Thus the ARL user/non-user studies provided us with an invaluable method of learning about how our library patrons used the NYU catalogs. In addition, they served as the basis for a diverse research project which built upon the original questionnaire and carried it further into new areas of research.

Data Collection

In September, survey forms were purchased from the University of California Division of Library Automation (DLA) and the project directors began planning for data collection. Once the survey forms and training manuals were in hand, the project directors identified twelve librarians who were willing to assist with the data collection process. After these volunteers were trained in the study's procedures, they participated in several sampling frames, collecting and coding data. By February, they had completed pre-testing 120 of the user surveys and 50 of the non-user surveys. Familiarizing the data collectors with the process and procedures of collecting data helped identify problems that might arise later during the official data collection period in April. The preliminary data was sent to DLA for processing and the results, received in early April, assisted in anticipating problems and outcomes of the study.

In the Spring, a research assistant was hired to work on the ARL funded project. She was joined by two other staff members assigned to the CLR-funded project: a sociologist and a researcher with expertise in statistics. An Advisory Board of four faculty members including an economist, a sociologist, a psychologist, and a public policy analyst, reviewed sampling methodology, survey design, and data analysis techniques. The study team worked with the Director of Public and Administrative Services and the Director of Automated Services to insure methodological soundness of the research design.

The data collectors surveyed both users and non-users during the month of April. Time blocks were determined by examining previous

years' use patterns and randomly identifying survey periods representing various levels of projected usage, so that a wide variety of morning, afternoon and evening users and non-users comprising a broad sample were captured. Most of the data collection periods were staffed by a member of the research team and one to three volunteer librarians. During each time block, 25 surveys were gathered, either in the online catalog/card catalog area, the Graduate Business School Library, or at the front door where non-users were screened. In total 1,607 Bobcat users and 2,922 non-users were screened (of whom 1,916 actually proved to be Bobcat users), resulting in the completion of 979 user forms and 498 non-user forms. Simultaneously, 235 online catalog and 130 card catalog skip surveys were collected of which 218 and 116 were usable respectively. During the summer, an additional 54 individuals were interviewed in conjunction with the CLR-funded project.

Following the data collection phase of the project, survey forms with the supplemental questions coded by the research team were sent to DLA for scanning and processing. At the same time, forms from the skip survey were coded and data were entered into a computer at New York University. Librarians then proceeded to verify search results recorded on the skip survey while preparations were underway for undertaking the interview stage of the project. The tracking of searches through the interview process was completed in July and final content analysis of those results is now underway. Various debriefings of project staff and volunteers have aided the data analysis project, adding insight and testimony to the final review process. Finally, a task force will work with the survey results to recommend new training programs and system design modifications, thereby making practical use of the survey results.

Survey Results

The CLR questionnaire provides a demographic profile of the user, information on attitudes regarding both success and levels of satisfaction in relation to particular searches, and general assessments of the technical features of the online catalogs. The non-user questionnaire includes the demographic information, questions on catalog and computer use, and a question on the probability of future use of an online catalog. The information collected is already proving invaluable to NYU in making decisions regarding the development of the catalog as well as in calibrating catalog instruction to user need. A further use, however, that has impact beyond the NYU library system, is the instructiveness of this data to Geac, the vendor of the NYU Bobcat system, in its development of online systems for more than 30 other libraries worldwide.

A preliminary review of data collected reveals a deep fascination with the new online catalog. This was expressed in language such as: "It's fun," "I enjoy it," "I can't live without it....", which is combined with reports of loyalty and commitment to using the online catalog even after numerous unsuccessful searches. At this point in time, the data base is still limited enough that lack of success due to the information not being in the catalog is a strong possibility. In accord with the initial hypothesis that led to the study proposal, many users express a high degree of satisfaction in using Bobcat regardless of the degree of actual success with locating an item in the catalog. This fascination or intrigue with the online catalog extends from

undergraduates who enjoy using it and have adopted a Bobcat as the mascot for the basketball team, to senior researchers who recognize its limitations but nonetheless use it heavily.

The extensive data collected cover all types of people surveyed. For present purposes, however, only the most interesting results regarding online catalog use are presented at the end of this report. NYU findings are compared with those of ARL libraries and other academic libraries included in the original CLR study. The tables are constructed from those found in Using Online Catalogs: A Nationwide Survey -- A Report of a Study sponsored by the Council on Library Resources, edited by Joseph R. Matthews, Gary S. Lawrence and Douglas K. Ferguson (NY: Neal-Schuman Publishers, Inc., 1983). The NYU preliminary data is based on a maximum of 836 users and 424 non-users interviewed in April 1984. A complete analysis will be found in the final report to ARL.

Project Activities Awaiting Completion

While a comparison of New York University data with that of the other 29 libraries in the CLR master study is yet to be completed, a preliminary review indicates that the results are parallel. An analysis of the special study, which is nearing conclusion, offers insight into some of the patterns exhibited in the tables above. All of this will be discussed in the final report to CLR.

Also remaining to be done are the transaction log analyses. These are dependent on the production of a statistical program by Geac (in progress). In the interim period, three random days of transaction logs will be examined in order to tabulate types of searches and numbers of different commands used. This should indicate how the catalog is being used as well as the distribution of types of searches.

Comments

The CLR questionnaire has revealed quite a lot about the attitudes of users. The benefits of the evaluative effort far outweigh the difficulties that the development of instruments and the administration of the CLR instrument posed. They provide an index of user expectation and success.

Since the research effort included an interview component (part of the CLR funding), NYU was able to gather information on how people actually searched. Although no claim is made to generality, the interviews (N=54) did point out user sources of error. These range from misspellings to errors which resulted from subject searches which were done without any knowledge of the controlled vocabulary used in the Library of Congress Subject Headings. One finding that has emerged from the interview component is that users seldom utilize Bobcat's keyword option. They seem to expect that subject searches will be performed by the computer according to natural language categories, despite notice to the contrary on terminal screens.

Another benefit of the study was the positive experience gained by the library staff who participated. Most report that the process of collecting data better informed them of how catalogs are used by patrons. Technical services staff had the chance to witness first hand

the public's interaction with the bibliographic records they created. Another interesting outcome occurred during data cleanup when 300 searches recorded by patrons were replicated by the reference staff. These searches turned out to be a rich source of information on how subject searches often miss the mark, primarily from failure to use appropriate subject headings, and on how often items missed in the computer catalog were available in the card catalog. The replication task also gave reference librarians an opportunity to better assess user need for bibliographic instruction and to plan accordingly.

Among the difficulties encountered were: the pressures of time on the research team since data collection was compressed into one month; the strain that siphoning off of volunteer staff time placed on normal library operations; and the length of the questionnaires which required users to donate up to 20 minutes to the survey. The latter meant that only patrons with that much time available could complete the survey. Furthermore, the CLR questionnaire itself, although well tested at other sites, contains questions that are ambiguous or inappropriate to NYU. A final difficulty lay in the inability to collect data at sites which are members of the Research Library Association of South Manhattan, a consortium of neighboring institutions whose libraries were scheduled to implement Bobcat this year. Since these libraries use the NYU catalog, it was hoped that questionnaires could be administered at two sites: the New School for Social Research and Cooper Union. However, due to a slowed installation timetable, these libraries were not ready in time for the April data collection.

Now that the data are being summarized in tabular form, the library is able to evaluate them and decide what action to take in response. The formation of a task force to examine additional signage, including terminal screen information, and classroom outreach efforts is a first step in addressing user search error. The evaluation of user requests for system improvements and data base expansion is a second. A further inquiry into reference and circulation statistics is now underway to ascertain how parallel the populations are who use the catalogs to these other sites of patron use.

In addition to evaluating the data, the library has decided that in order for the results to be meaningful some index of book availability must be provided. To accomplish this, a polling device has been installed at the exit of the main library. As users leave the building, they are being asked whether the book(s) they sought were available in the stacks, on reserve, in the reference section, etc. Although only a rough measure, this should yield some indication of success in actually finding the book. The reason for introducing this additional measure was that, when asked to identify characteristics of a successful search, many users listed finding the book on the shelf as so important that failure to do so nullified any success they experienced in finding the book in the catalog. Ultimately, the actual delivery of information remains the goal of library services. Online public access catalogs, no matter how successful, still remain only an intermediate tool toward satisfying users needs.

Conclusion

Undoubtedly, the library staff learned a great deal about library users and online catalogs during the grant period. They also had a chance to work with different colleagues in a totally novel setting.

Furthermore, they participated in a major applied social science research project -- an opportunity unavailable to most librarians. Once the final report of the project is complete a presentation on the findings will be made to the entire library faculty. It is hoped that this program, as well as others conducted during the course of the year, will have involved all staff to the greatest extent possible. In this way their awareness and understanding of the introduction of new technology in a library setting will increase. It is also hoped that the study can be repeated in the future so that an analysis of the diffusion of this innovation can be undertaken.

Table 1
USERS
N=836

	ARL Libraries %	Other Academic Libraries %	NYU %
Type of Search Reported			
A subject heading or headings	40	37	45
A complete author's name	39	36	49
A complete title	36	40	38
Topic word or words (keyword or term searching)	28	37	30
Part of an author's name	18	15	14
Part of a title	16	16	14
Part or a complete call number	7	0	2
(User was reporting on his or her last search, not all searches performed in the session.)			
Information Search Task			
I was trying to find:*			
Books on a topic	51	54	54
Specific book	52	49	52
Books by a specific author	25	21	29
If book is available	18	14	9
I came with:*			
Subject heading	42	40	48
Complete author	45	38	54
Complete title	41	42	42
Topic word or words	28	36	26
Part of an author's name	14	12	12
Part of a title	12	11	11
In this computer search I found:			
Some of what I was looking for	40	41	45
All or most of what I was looking for	26	30	22
Nothing I was looking for	19	12	19
More than I was looking for	15	18	14
I came across things of interest other than what I was looking for (Percent responding yes.)	46	52	46

Table 1 (cont)

Attitudes Towards the Online Catalog			
This computer search was:			
Very satisfactory	44	53	42
Somewhat satisfactory	34	32	37
Somewhat unsatisfactory	11	9	9
Very unsatisfactory	12	6	12
Overall or general attitude toward the online catalog is:			
Very favorable	68	73	62
Somewhat favorable	26	22	31
Somewhat unfavorable	5	4	5
Very unfavorable	1	0	2
Compared to the card, book, or microfiche catalog in this library, the online catalog is:			
Better	74	82	70
Equal	17	15	17
Worse	9	3	13
Learning to Use the Online Catalog			
Heard about the online catalog:			
Noticed terminal in library	66	44	69
Library course or orientation	13	18	*
Friend or family member	8	10	8
Library Staff	6	17	2
Instructor	5	10	2
*Library tour-8%; Article-Announcement 13%			
Learned how to use online catalog:*			
By printed instructions	56	48	35
By library staff	20	43	3
By instructions on terminal	32	30	53
By myself	21	15	29
From a friend	15	18	10
From a library course	7	15	1
I got help from:*			
Printed matter, signs	41	36	16
Terminal screen instructions	33	34	60
Did not get help	35	30	35
Library staff member	12	33	5
Person nearby	4	4	3

Table 1 (cont)

Additional System Features Desired			
View related words	48	41	41
Search table of contents/index	44	44	52
Determine if book checked out	25	47	73
Print search results	27	26	38
Search subject by word	23	28	27
Step by step instructions	18	29	7
Search by journal title abbreviation	25	20	21
Search by title word	16	22	17
Search for illustrations & bibliography	19	16	22
Limit search by language	14	5	12
Change display order	11	11	10
Limit search by date of publication	13	12	12
Location of book in library	13	24	30

*Legitimate multiple responses possible; therefore totals may be larger than 100%.

Table 2
NYU Supplemental Questions
N=836

Compare the success of the computer and card catalogs as a place to search:

	%
Computer Catalog More Successful	49
Card Catalog More Successful	27
They are Equal	23
Neither Catalog Successful	2

In general, do you look in both the computer and card catalogs to complete your searches:

Yes	62
No	38

Table 3
NON-USERS
N=424

	ARL Libraries %	Other Academic Libraries %	NYU %
Non-User Attitudes About the Online Catalog			
Ease of learning to use the online catalog:			
Somewhat easy	47	51	48
Very easy	38	27	34
Somewhat difficult	15	20	17
Very difficult	1	2	1
How likely to use online catalog in future:			
Somewhat likely	42	44	36
Very likely	29	32	39
Somewhat unlikely	19	16	16
Very unlikely	10	8	10
General attitude toward online catalog:			
Very favorable	43	42	47
Somewhat favorable	48	47	43
Somewhat unfavorable	7	9	8
Very unfavorable	2	2	3
Compared to the card, book, or microfiche catalog, this online catalog is:			
Better	29	37	31
Equal	16	19	14
Worse	3	3	4
Can't decide	52	41	51

N.B. Percentages may total more than 100% due to the rounding of raw percentages.

The Effect of an Instruction Program on Online Catalog Users[1]

The Pennsylvania State University Libraries

Mary Ellen Larson, Principal Investigator
Dace Freivalds

Penn State's study explores the role of instruction in determining the success of the first-time online catalog user by defining three relationships in an experimental setting: (1) the comparative effectiveness of four instructional methods in orienting users to the online catalog (2) the influence of an instruction program on user reaction to an online catalog and (3) the role instruction plays in influencing searching and efficiency over a period of time. A pre-test was administered to study participants, each of whom then received one of four instructional treatments: (1) online instruction (2) printed pocket-guide (3) audiovisual slide/tape program and (4) librarian-led workshop. Two post-tests were administered, one at the conclusion of the instructional sessions and one six months later.

A preliminary analysis of collected data indicates three conclusions: (1) three instructional methods (the pocket guide, slide/tape presentation and workshop) don't vary in their instructional effectiveness (2) Penn State's online catalog is a congenial system for the first-time online catalog user and (3) the effect of online instruction as a "stand alone" method of instruction is less clear than it once was. There appears to be no correlation between participants' attitudes toward the online catalog and their ability to search that catalog accurately and efficiently. A poor response rate for the second post-test prevented any conclusive analysis of those results.

INTRODUCTION

Librarians at Penn State have spent most of the last 18 months anticipating the birth of our online public access catalog, LIAS--an acronym which stands for Library Information Access System. Since 1975, Penn State has been developing a computerized, integrated system that would allow users to find information about library materials using three subsystems--acquisitions, cataloging and circulation. In Fall 1983, two portions of LIAS--the online catalog and the circulation subsystem--were finally available to patrons. While this was a joyous event for our systems staff, those of us in public services felt a sense of un-

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[1]From a presentation give at the Reference and Adult Services Division, Catalog Use Committee Program, American Library Association, Dallas, June 25, 1984.

easiness as we wondered how we would coax our patrons to accept a computer terminal where a card catalog once stood. Just how would our users, who include citizens from across the Commonwealth as well as university students and faculty, adjust to this revolutionary new library tool?

It seemed obvious to us that a well designed user education program--with brochures, demonstrations and the like--would do much to gain the good will of our users. Having decided this however, several questions remained:

1. First: What kind of program would be flexible enough to function in a variety of situations? Penn State is a multi-campus university--in addition to the main campus at University Park, there are 17 two-year campuses scattered across the state, a graduate studies center near Philadelphia, a four-year college in Erie, and an upper division campus in Harrisburg. A variety of staffing patterns and user requirements exist in this system. Therefore, whatever we designed would have to be effective in several different settings.
2. Another concern was staffing--how could our staff, already pressed to the limit, cope with the inevitable surge of questions that would accompany the appearance of LIAS? We suspected that there would be little if any increase in professional staff to handle the demand we anticipated. Could we design an effective education program that would be largely "self-instructional" for the inexperienced user?
3. Finally we decided that there were 4 instructional methods available to us--the traditional "pocket guide" of written instructions, a sound/slide audio-visual presentation, a librarian-led workshop featuring a demonstration of the systems, and a series of online instruction imbedded in LIAS itself--was one of these methods particularly effective for teaching inexperienced users how to use an online catalog?

Clearly, we needed to know more about the effect of an instructional program on the first-time user. Several articles suggested that a strong instruction program can positively influence user response. Yet little evaluative data existed to support this assertion and no one detailed exactly how instruction influenced the performance of an inexperienced user.

We realized that the research necessary to find the answers to these questions required more time and money than was available to us. With this consideration in mind, Penn State applied for and received a grant from the Association of Research Libraries, which enabled us to explore the role of instruction in determining the success of the first-time online catalog user. Our study defines three relationships in an experimental setting:

1. One--the comparative effectiveness of four instructional methods in orienting users to the online catalog,
2. Two--the influence of a user-education program on user reaction to an online catalog, and
3. Three--the role instruction plays in influencing searching performance and efficiency over a long period of time.

RESULTS

Having provided that introduction, let me present the results of our study. (Chart 1) This time line indicates the various phases of our research. First, we identified a number of students who were interested in learning to use LIAS. After disqualifying those students who had some previous exposure to LIAS, we randomly assigned each of the remaining participants to 1 of 4 instructional groups and 1 of 6 test sequences. We then administered a pre-test to all participants, the participants received the appropriate instruction and we administered a post-test and attitude survey. In approximately 6 months, another test was given to those participants who completed the first post-test. In each of the three tests, we were measuring two conditions: performance (which we evaluated by scores on the one "pre" and two "post"-tests) and efficiency (which we measured by the time each participant needed to complete the test.)

Our study was concluded in April, 1984 and a preliminary analysis of the data indicates three distinct behavioral patterns. The first pattern we noticed is that there appears to be little difference in the improvement rate among the four groups. No one group stands out as more proficient than any other. (Chart 2) This transparency depicts the improvement in score between the pre-test and the first post-test. As you can see, the improvement clusters around 4.5 points for each group. (Chart 3) The next transparency indicates improvement in time (improvement in this case is represented by a negative number since we are subtracting a larger number, the pre-test time, from a smaller number, the post-test time). Improvements in time are clustered around 2 midpoints--45 minutes and 15 minutes. Within these midpoints, the representation of each group appears somewhat even. Using a 2-way analysis of variance, we compared the scores and times among the groups; we also looked at the differences between times, scores and the ratio of score to time. In no case did there appear to be any significant instructional group effect.

The second pattern we noticed is that there was more improvement in the efficiency of the participants than in the performance in each group. Indeed, performance scores on the pre-test were relatively high and remained so on the first post-test as well. (Chart 4 and 5) As you can see from this transparency the pre-test scores clustered around 27.5 out of 30 pts. for the overwhelming majority of participants--this tendency is evident in the post-test score as well. There is a clearer improvement in efficiency, however. (Chart 6 and 7) This transparency shows that the pre-test times of the majority of participants clustered around the 37.5 minute and 62.5 minute midpoints. The posttest 1 time indicates a greater concentration of participants at the 37.5 minute and 12.5 minute midpoints.

The third pattern we noticed was that one group dropped out significantly at the pre-test phase of the experiment: the online instructional group. 105 participants did not return the pre-test form--of this group, 35 belong to the online only instruction group; this number represents 54% of the group's orig-

inal population. Only 38% of the other instructional groups combined dropped out of the experiment at this point. Since participants knew their instructional group assignment when they received their pre-test, and in fact could use online instruction during the pre-test (since it was embedded in the system), this result is especially interesting. Another interesting characteristic of the online dropouts was that 51% of them used the library less than 2 hours a week for research.

We also analyzed our data to determine if any relationship exists between performance and/or efficiency and a number of other factors, such as gender, prior library instruction, prior computer experience and frequency of library use. We could find no significant relationship in any case. We also checked the correlation between the participants attitudes toward LIAS and their score and time--there was no correlation. There was also no correlation between participants attitudes toward the instruction they received and their scores and times.

Unfortunately our response rate was so low for the second post-test--only 38 students returned their forms--that we could not infer anything conclusive from those results. Except to say that the patterns of behavior established in the pre and post-test--improved efficiency and continued high scores--persisted in the second post-test.

The performance of the online group caught our attention and we looked at its data more closely. This closer examination revealed that the online group was the only one which did not show a significant improvement in test scores at the post-test stage. This result appeared to be a discrepancy with the initial analysis of variance finding. But we determined that this discrepancy occured because there is too much overlap among the group scores to discriminate among groups--that is, the scores cluster too closely around the mid-to-high 20's to effectively distinguish one group's performance from another's using analysis of variance. Yet there is enough precision in our estimates of the average score and time for each group to distinguish the performance of 3 of these groups as being significantly different from 0, thus indicating improvement. The online instruction group was the only group whose average score did not significantly improve.

CONCLUSIONS

What does our data tell us about the effect of instruction on the behavior of a first-time online catalog user? The first thing it tells us is that three instructional methods--the written pocket guide, the audio-visual program and the demonstration/workshop--don't vary significantly in their instructional effectiveness. This was important for Penn State librarians to discover, since our staffing patterns don't always allow for staff-intensive instructional methods. We can tailor our method

of instructional delivery to suit the particular campus or library in question.

The second conclusion we reached is that the relatively high scores on the pre-test indicated to us that LIAS is ultimately a congenial system for the first-time user. Our dean is fond of saying that LIAS is so easy that anyone can use it. While we think this probably overstates the case to some extent, we observed in the study, and in our informal observations as well, that LIAS seems less frustrating to the inexperienced user than either the card or COM catalogs. Rather than being "user-friendly," LIAS seems to be "user-cordial," in that it creates a supportive environment where the user feels free to experiment. By always providing some kind of positive response to an inquiry, LIAS encourages confidence rather than frustration. Interestingly enough, we gave the performance tests to a group of librarians experienced in LIAS--their times hovered between 20 and 25 minutes, which was only slightly better than the average post-test time of the participants.

The third conclusion we reached is the effect of online instruction as a "stand-alone" method of user orientation is less clear than it once was. The drop-out rate of the online group concerns us, because participants had a chance to use the online instructions in the pre-test (since they are embedded into the system and their use is encouraged by a user prompt). That such a large percentage of participants chose not to continue their participation in the experiment after working with these instructions indicates that perhaps this method is not the most effective one for the first time user. Since a large percentage of the online dropouts had no library experience as well, then perhaps online instruction should be combined with another instructional method when teaching the use of an online catalog to a beginning library user.

In summary, we can say that our study provided us with a clearer picture of how inexperienced users react to a new technology--the online catalog. We also have a more comprehensive understanding of the role instruction can play in these reactions. With thisinformation in hand, librarians at Penn State can now design a user education program that will be both cost-effective and user-effective.

Chart 1

PSU Study: An Outline

286 Students

I. Random Group Assignment

33 disqualified → prior LIAS experience

253 Students

II. Students Receive Pre-test and Group Assignment

105 did not return pre-test form

high dropout rate > ONLINE INSTRUCTION GROUP
STUDENTS WITH NO PRIOR LIBRARY INSTRUCTION

148 Students

III. Students Receive LIAS Instruction

128 Students

IV. Students Receive/Return Post-test I

20 students did not return Post-test I

no differential dropping out

109 Students

V. Students Receive/Return Attitude Survey

38 Students

VI. Students Receive/Return Post-test II

Chart 2

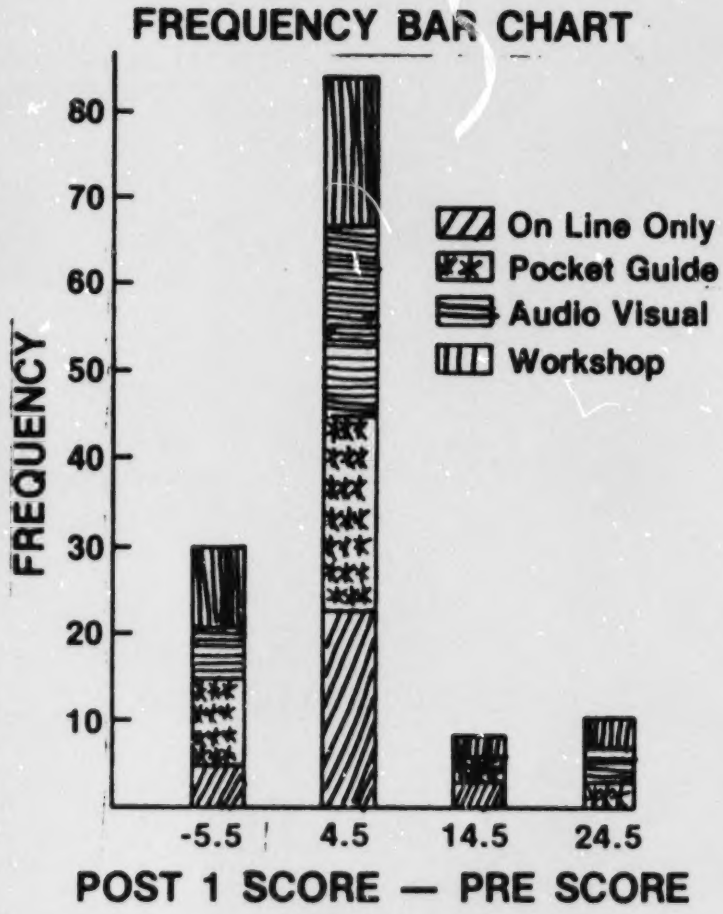

FREQUENCY BAR CHART
FREQUENCY
80
70
60
50
40
30
20
10
On Line Only
Pocket Guide
Audio Visual
Workshop
-5.5
4.5
14.5
24.5
POST 1 SCORE — PRE SCORE

Chart 3

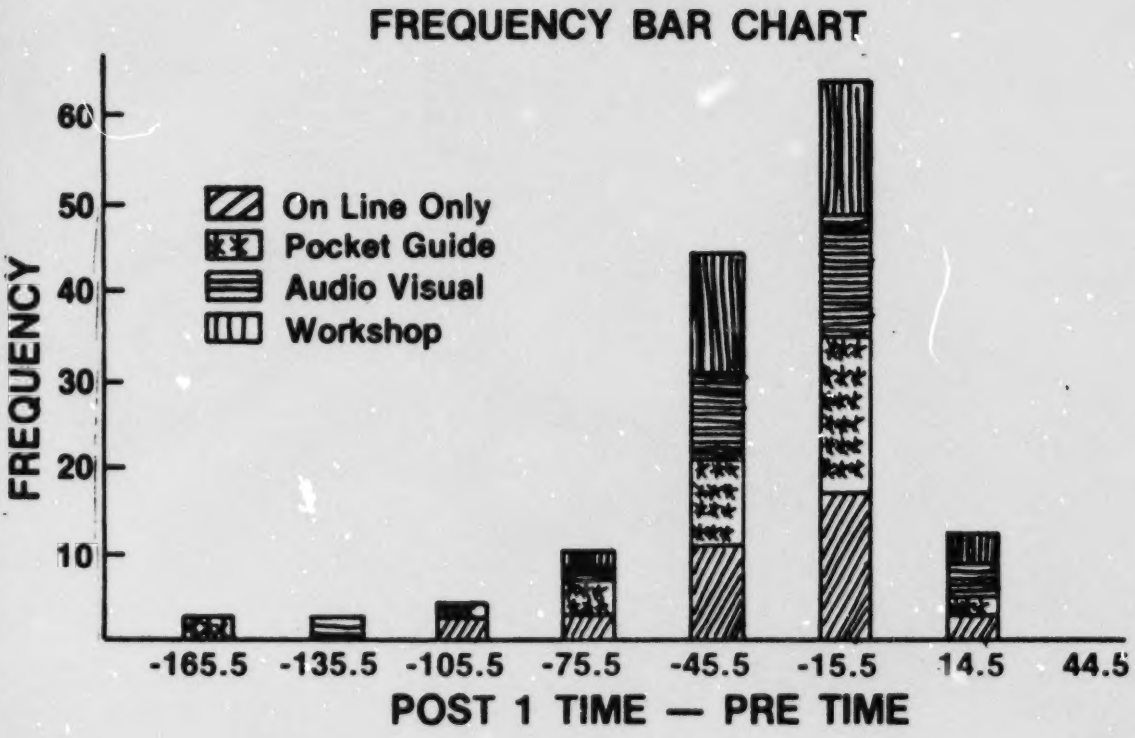

FREQUENCY BAR CHART
FREQUENCY
60
50
40
30
20
10
On Line Only
Pocket Guide
Audio Visual
Workshop
-165.5
-135.5
-105.5
-75.5
-45.5
-15.5
14.5
44.5
POST 1 TIME — PRE TIME

Chart 4

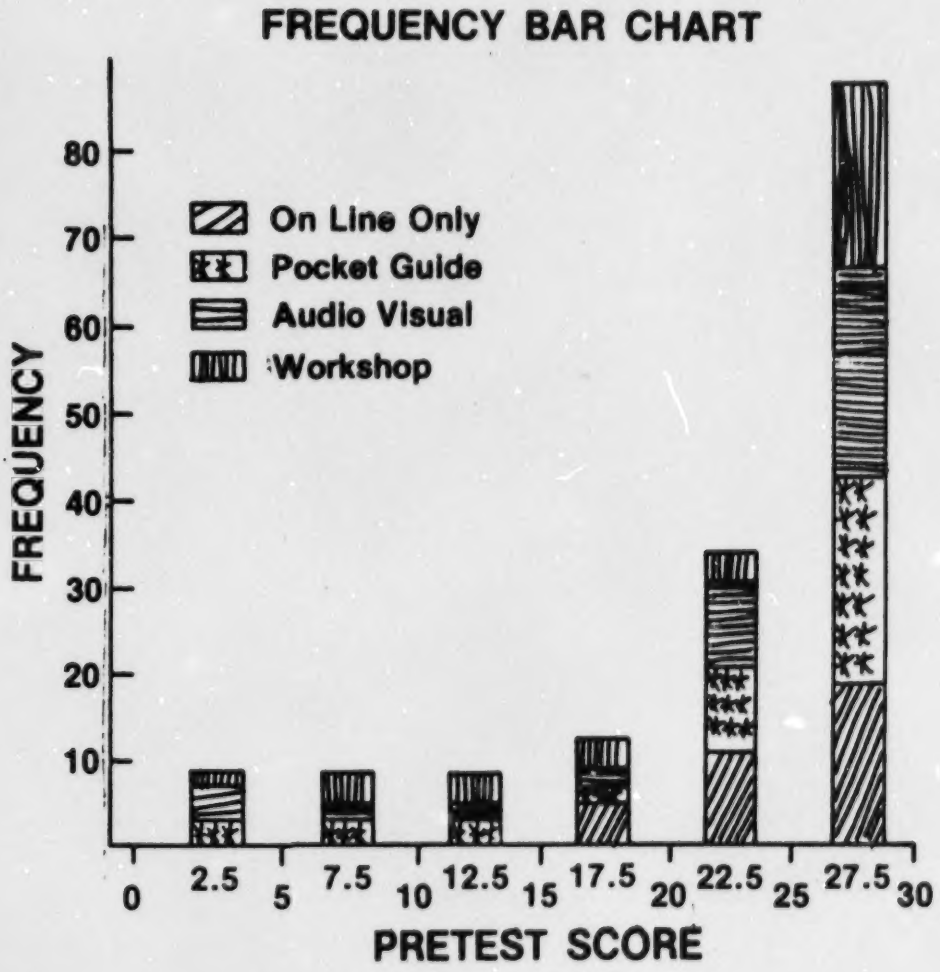

FREQUENCY BAR CHART
FREQUENCY
80
70
60
50
40
30
20
10
On Line Only
Pocket Guide
Audio Visual
Workshop
0
2.5
5
7.5
10
12.5
15
17.5
20
22.5
25
27.5
30
PRETEST SCORE

Chart 5

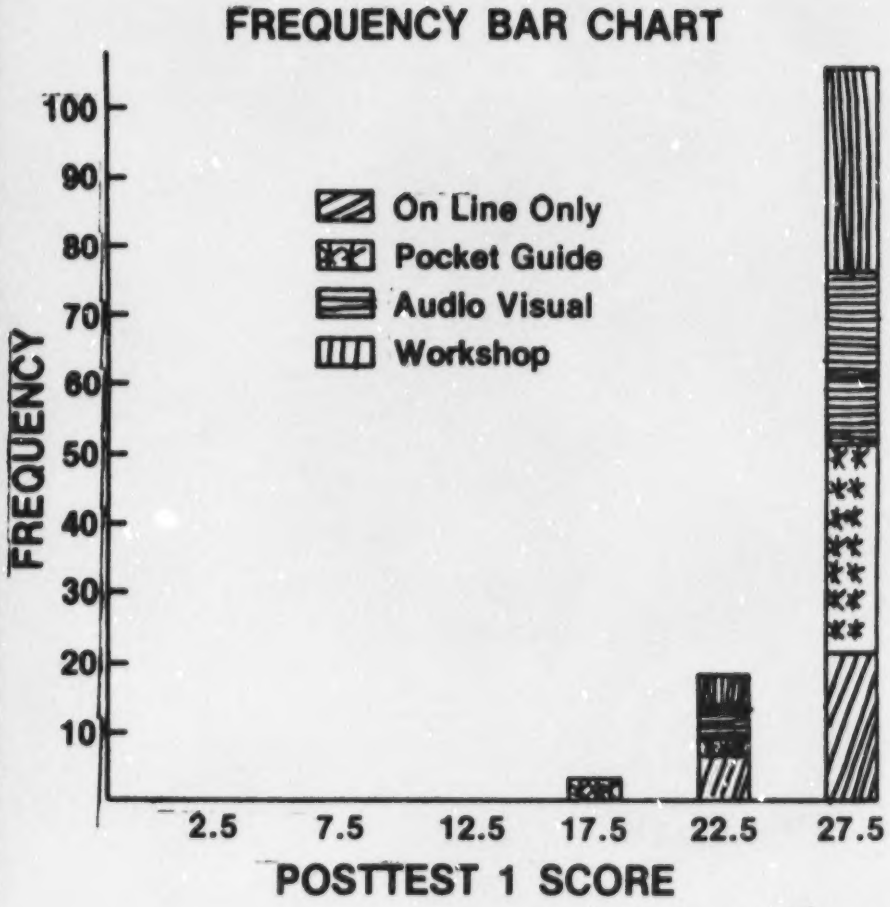

FREQUENCY BAR CHART
100
90
80
70
60
50
40
30
20
10
FREQUENCY
On Line Only
Pocket Guide
Audio Visual
Workshop
2.5
7.5
12.5
17.5
22.5
27.5
POSTTEST 1 SCORE

Chart6

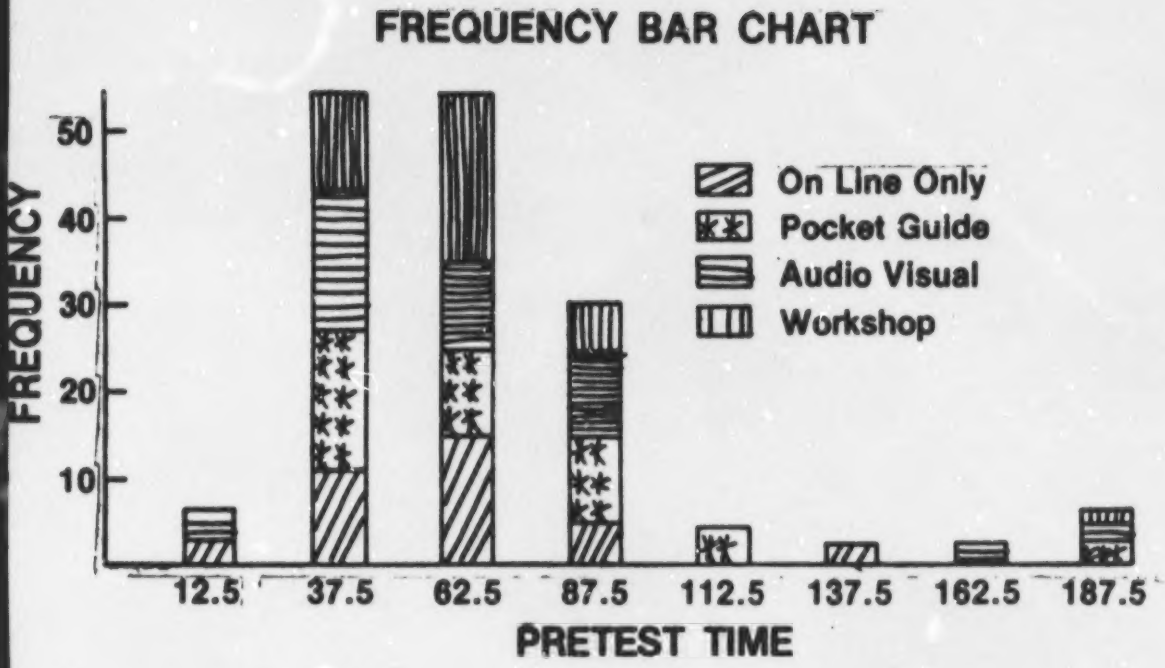
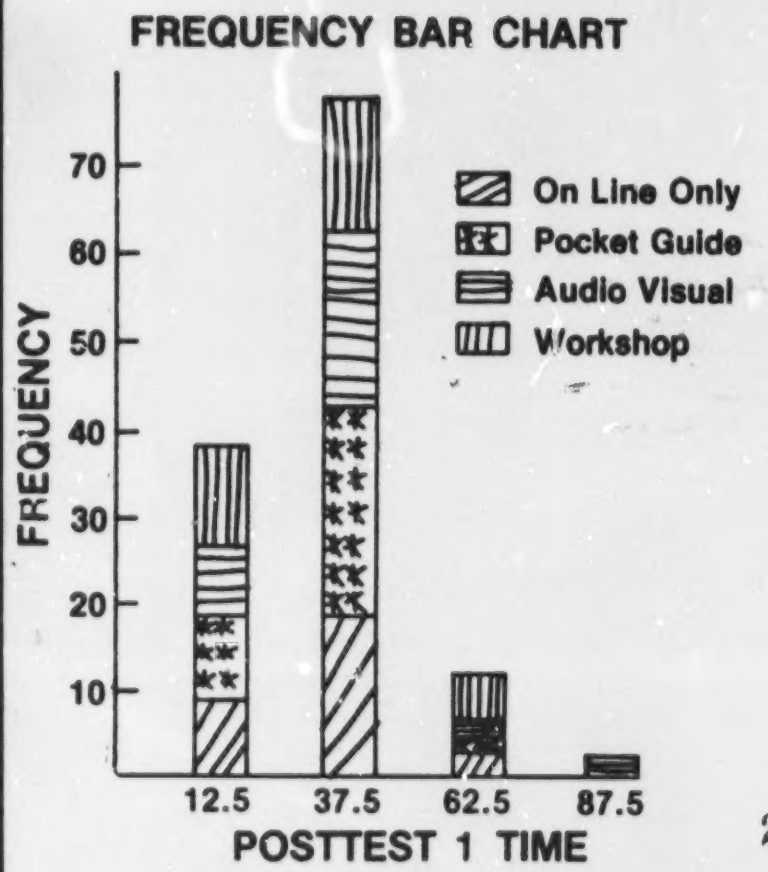

FREQUENCY BAR CHART
FREQUENCY
50
40
30
20
10
On Line Only
Pocket Guide
Audio Visual
Workshop
12.5
37.5
62.5
87.5
112.5
137.5
162.5
187.5
PRETEST TIME

Chart 7


FREQUENCY BAR CHART
FREQUENCY
70
60
50
40
30
20
10
On Line Only
Pocket Guide
Audio Visual
Workshop
12.5
37.5
62.5
87.5
POSTTEST 1 TIME

Assessing the Instructional Needs of Students* in a Selected Scientific Discipline at the University of Arizona

Louise Greenfield, Project Director
Jeanne Pfander
Chris Sherratt
Karen Williams

Abstract

This study is designed to assess the instructional needs of students at the University of Arizona in a selected scientific discipline and explore methods in which our instructional program can respond more effectively to the needs of these students. Based on the results of this study, we will develop an effective library instructional program for students in the selected scientific discipline. This process will serve as a model for exploring and assessing instructional needs in other science disciplines.

The following description of the University of Arizona, the University Library, and the Library Instruction program should put this study into a meaningful context.

There are 30,000 students enrolled at the University of Arizona, almost 23,000 of them are undergraduates. Of these, 4,985 are freshmen. About three quarters of the students are from Arizona. There are eleven undergraduate colleges offering bachelor's degree programs. The average SAT verbal and math combined score for students is about 950. Students come from families of all income ranges. Within a four-year experience, about 50% of all students will receive some form of scholarship for financial aid.

The University of Arizona Library is a large research library. Our collection consists of almost 5 million items. We have 18

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*From a presentation given at the ACRL Science and Technology Section program, American Library Association, Dallas, June 23, 1984.

departments spread out over five different buildings, including a Main Library (Humanities, Social Sciences and Fine Arts), and a Science-Engineering Library (Applied and Pure Sciences). So it is a large, resource-rich collection, but also a very complex facility.

The Library Instruction Department is responsible for planning, coordinating, and evaluating the programs to instruct students in effective use of the library. The actual instruction is done by librarians and career staff from throughout the library System.

Our program includes a Library Skills Program. This is a self-paced workbook program which is administered to incoming freshmen through their English 101 classes (the first course in freshmen composition sequence). This program introduces students to basic library skills and concepts and familiarizes them with the resources, the organization and the services of the U of A Library.

In English 102 where students have the opportunity to further develop their writing skills, they have the opportunity to develop and refine their research skills as well. Instructional sessions are offered to these students which are designed to introduce them to sources of literary criticism appropriate to their topic. These sessions are individualized and directed toward the work each class is studying. Emphasis is placed on when and how to use sources, where they fit in the research process, evaluation of sources, selection of the proper sources, and the organization of literature in the discipline.

The program for more advanced, upper-level instruction is done in the form of 50-minute course-related instructional sessions which are requested by faculty members and presented to undergraduate and graduate students in departments throughout the University. These instructional sessions are given by librarians with subject expertise. They introduce students to the major reference tools in the field, the access tools such as the card catalog, and important indexes and abstracts. Covered are such research techniques as developing a search strategy (the steps in the research process), and organizing concepts, such as the sequence in which information appears in publication.

Several factors provided the impetus for this proposal. Within the state of Arizona and the University of Arizona there is a renewed interest in strengthening of science education. Despite this commitment, the report of the Science-Engineering Library OMS Sponsored Planning Study identified the following problem areas in the instruction program: 1) The study identified the lack of an adequate introduction to the Science-Engineering Library in the Library Skills Program; 2) The study identified a lack of emphasis on library use instruction

in science courses.

Another factor entered into the decision to do this study. The Faculty Senate of the University of Arizona approved a program to ensure that student writing skills were assessed and developed throughout their college years. Included in this program were: 1) An Upper-Division Writing Proficiency Examination that helps determine the level of student readiness to do work in writing emphasis courses in their major fields. 2) There is the beginning of a movement to establish a writing emphasis course in each major university department. Successful completion of a writing emphasis course will be a requirement for graduation.

The University Composition Board, the body which devises, administers, and grades the Upper-Division Writing Proficiency Examination had asked the University Library to participate in this testing program. The library staff was asked to develop and score a library research skills portion of the examination, designed to assess students' level of library skill and knowledge.

The library research skills portion of the Proficiency Examination was developed during the 1982-83 academic year by the Library Instruction Advisory Committee, a group of University of Arizona librarians concerned with and committed to monitoring and improving the library's instruction program.

The examination was based on a set of Learning Outcomes developed by this Committee. These objectives now serve as the basic objectives for the Orientation and Instruction Program. These help to ensure consistency in the teaching of library skills and concepts by librarians and career staff throughout the University of Arizona Library.

The examination, a 30-question objective test, has been administered with each administration of the Writing Proficiency Examination. The test serves both as a diagnostic tool and as a tool to begin establishing university-wide standards for student research skills. The exam, we determined, would give us a systematic method for evaluating the research skills of students in the chosen scientific discipline and the writing emphasis course could prove an ideal vehicle for placement of a library instruction unit. We also had a set of learning outcomes, or objectives for the instruction program which could be explored with faculty members.

The above information should provide an overview of the University, the student population, the Library, the instruction program, and the impetus for the study. The following will outline the study objectives and the research methodology.

This study has the following objectives: 1) To assess the effectiveness of the library's instructional program on students' beginning course work in a selected scientific discipline; 2) To communicate to faculty members in the selected scientific discipline the specific Learning Outcomes which University of Arizona librarians believe are important for students to achieve; 3) To understand expectations which faculty members in selected scientific disciplines have established for their students; 4) To use this process as a model in other selected scientific disciplines.

Our methodology includes: 1) Development of an "in library" performance test to be administered to a representative sample of students to help determine the validity of the objective test instrument; 2) Continued modification of the objective test instrument; 3) Exploration with faculty members from the selected scientific discipline of the Learning Outcomes the library has established for their students and comparison of these Learning Outcomes to the expectations faculty members have for their students; 4) Modification of our Learning Outcomes based on our findings; 5) Survey of student needs and attitudes.

Anticipated outcomes include a performance examination, a set of modified Learning Outcomes, a model instructional program for students in the selected scientific discipline, with recommendations for integration of an instructional unit within the department's writing emphasis course, and a model process for exploring and assessing instructional needs of students in a selected scientific discipline.

This study will focus more formal attention on the goals of our instruction program for upper level subject oriented researchers. The results of this study will allow us to strengthen our overall instruction program (e.g. Library Skills Program) as well as the instructional program directed to specific scientific disciplines. Library staff members involved in instruction may recognize the need to strengthen their knowledge of sources in science and technology, the organization of scientific literature, and methods of scientific research.

The grant period began officially in January 1984, however, preparatory work began in the Summer of 1983 and continued into the fall semester. Our immediate task was to develop criteria for the selection of a department, develop a checklist to identify information relevant to the selection.

The OMS grant members met with the Science-Engineering reference librarians for assistance in the selection of a department. It was decided that these librarians would be a valuable resource in supplying some of the information on the checklist. Because science librarians work with science faculty and students, we assumed they would have familiarity

with their research patterns, their curriculum, and their library related assignments.

Science librarians felt they would be especially helpful in answering the following questions: 1) Is this department representative? 2) Does the U of A Library have adequate holdings to support an instruction program for this department? 3) Are faculty members supportive and willing to cooperate? 4) What is the department's past library instruction history? 5) Do faculty members rely on themselves or on graduate students to do research? 6) What are your impressions of the methods or patterns of library use by scientists/students in this department?

It was decided that science librarians would respond to this checklist for the two or three departments with which they felt most familiar. It was understood that they could not respond to every item on the checklist. Their choices of departments were based on familiarity and the criteria. The departments most often chosen were Geosciences, Mining and Geological Engineering, and Chemical Engineering. Their comments were taken into consideration as the selection process went on. An initial selection of nine departments was then made based on local factors, our criteria, and the guidelines of the grant. These were: Nutrition, Geoscience, Chemistry, Chemical Engineering, Mining and Geological Engineering, Civil Engineering, Hydrology and Water Resources, General Biology, and Wildlife and Fisheries and Recreation Resources. We charted the cumulated information and selected six departments for visitation. These were: Mining and Geological Engineering; Wildlife, Fisheries and Recreation Resources; Soils, Water and Engineering; Chemistry; Geosciences; Civil Engineering and Engineering Mechanics.

It was determined that an appointment would be made with each department head during which time the points on the "Interview Guide - Science Department Heads"** would be discussed. We decided that only by interviewing the department head would we get a firm idea of willingness to commit staff time to the grant project.

A member of the grant project team and a Science librarian were paired to make the visitations. One team member was primarily responsible for recording the department head's comments. The questions on the interview guide covered the following topics: Research; Faculty and the Library; Librarian's roles; Departmental courses and the Library; The future: professions, information needs.

The interview guide proved an effective tool to compare and

**Spec Kit 101, User Studies in ARL Libraries, Washington. Office of Management Studies. February 1984.

contrast responses to the same questions. Some questions proved revealing. While almost all department heads saw a need for students to learn research skills, many balked at the suggestion of including this in their undergraduate curriculum. While most agreed librarians should have a role in evaluating students library skills, many denied librarians a role in teaching students how to evaluate information. We concluded our interviews by asking department heads if they would guarantee faculty time to work on the grant project.

Other elements were taken into consideration. In one case the department was going through organizational changes which rendered it too unstable for consideration. In another, students and faculty members spent too much time 'in the field' to allow sufficient time for collaboration.

Insight was gained into the organization and composition of specific departments. In one case, a department head exclaimed "We have so many oddballs, we do not hire them for their ability to communicate. They work independently and collaboration will have to be done individually and on an hourly basis. In libraries, so much work is done through the committee structure we can forget that not every department functions effectively in that manner.

While the main purpose of our visits was to choose the department most appropriate for this study, we did not see our interviews as terminal. We made clear to departments that this grant would be directed to one department, but we intended to build on our results and work with other departments in the future. As a result of our meeting, we have a clearer understanding of the departments' curriculums, student research needs, and the research skills faculty members expect of their students.

Narrative reports were written and a summary report for each department was presented orally to the Science-Engineering reference staff. The final selection of the Division of Wildlife, Fisheries and Recreation Resources, School of Renewable Natural Resources was made by the grant project members with recommendations from the Science-Engineering Library staff. Important issues affecting the selection were:

- The department is research oriented
- All undergraduate course levels are represented
- The library has an adequate collection to support programs in this area
- The process of developing a program for this department would be transferrable to other disciplines in the sciences
- There is an expectation of library skill levels, although students do not all come close to achieving them

- Librarians are seen as having a role in teaching and evaluating students' research skills
- Students in this Division are identified as having a need for library instruction

We first met with the faculty members from the Division of Wildlife, Fisheries, and Recreation Resources in an open session with all members present. During this meeting I summarized the grant proposal, outlined the proposed timetable and suggested how we could proceed together. It was decided that we would meet in smaller groups to explore our list of "Discussion Points," a list of questions designed to promote open discussion and exchange of information and ideas. Because much of our discussion would focus on library concepts and skills, faculty members felt groups of at least three to five would be beneficial. They believed they could learn from their colleagues' thoughts and responses. Faculty members were given a copy of the grant, two readings on library instructional theory and practice, and a copy of the "Discussion Points." Course forms were distributed to be filled out and returned prior to our next scheduled meeting. The discussion points were covered in three meetings during the following week. Grant team members met following these meetings to discuss, clarify, and record the information and issues which came from these sessions. Topics covered included use made in this field of professional societies, the information skills, other than Library Skills, they would like their students to learn (e.g. observation) and where they saw a library skills unit fitting into the Division.

Our next series of meetings focused on discussions of the Learning Outcomes. These Learning Outcomes, developed by the Library Instruction Advisory Committee, serve as a basic set of objectives for our instruction program. The purpose of these meetings was to communicate to faculty members the library skills which we believe are important for students to achieve. Equally important was to learn the research skills faculty members identified as being important to their students, and to understand the expectations they had for their students.

The General Learning Outcomes are:

1. Students will recognize various formats of materials from which information can be retrieved.
2. Students will recognize that materials are organized by a classification system.
3. Student will know how to use the tools which give access to information.
4. Students will know basic library terminology.
5. Students will apply library knowledge towards setting up effective search strategies.

We went step by step through our set of learning objectives. In some cases much explanation was required. Faculty members were unfamiliar with skills we listed, concepts such as search strategy, and sources such as the Library of Congress Subject Headings.

As a result of the meetings, we were able to identify:

1. Skills we think are basic for students to have by the end of their sophomore year.
2. Skills and concepts which we think the grant project should directly include and teach students.
3. Observations and issues which should be considered when designing the model unit. These considerations include: heavy use made of citation tracing; emphasis on key people and key research; cumulative nature of scientific literature.

We are now translating these modified Learning Outcomes, and considerations into a concrete instructional unit. A working model has been developed in collaboration with faculty members.

Conditions were identified as being important based on the above considerations. For example:

- We believe it is important to be presented in the first semester of the junior year (transfers have a chance to use skills).
- It is important to build in a mechanism for continued collaboration, after the initial year (continue modification and reassessment).
- The unit should be presented with faculty members so library research skills are not perceived to be apart from the curriculum.
- While process is important, it must be brought home to its practical application - access points, emphasis on finding information.

The unit will be integrated into a 300 (junior level) course "Introduction to Wildlife and Fisheries." This is a required course of all four divisions in the School of Renewable Natural Resources. It will be presented in four class sessions. Each of the sessions will be a week apart. The skills which were identified as being basic will be covered outside of the primary unit. We are developing a self-paced exercise program which students will complete during the third week of classes. It will be scored by librarians, but no grade assigned. The four class sessions will begin two weeks later. Content will include known item searching, indexes, government documents, publication sequence and citation tracing. Format will include lecture, discussion, group and independent assignments. Students will receive a binder, and handouts and information will be added to it throughout the four sessions. Each skill or Learning Outcome which was identified, will be addressed

through one of the four units. Units are being developed around the considerations of how students do research and need information. For example, taking into consideration the fact that much research is known item searching and there is a reliance on key articles and research, the unit on indexes will not emphasize the traditional "finding information." Use of indexes will focus on narrowing a topic, the development of a list of key words, and 'finding information' from related fields, management, public administration, law.

The importance of continued collaboration and modification must be emphasized. For example, the unit on publication sequence was developed to address the following objectives:

- Students will be introduced to the sequence in which information appears in publications in the sciences.
- Students will learn how publication sequence reflects communication.
- Students will distinguish between primary and secondary sources, and popular and scholarly sources.
- Students will identify major types of information sources, their major purpose, function, and format.

A graphic representation of publication sequence was presented to faculty and a detailed outline of the proposed unit. We thought it provided a much needed framework for students. The Faculty was less than enthusiastic. The objections were: too theoretical, it would not be considered relevant, students would not need to be introduced to the informal network.

Computer-assisted literature searching was discussed. Although several librarians felt it would be unthinkable to do a 1984 instructional unit and not focus on this topic, the faculty want it introduced and covered, but not emphasized. They prefer that time be spent on solid skills fundamentals.

There will be a final project, which we are still in the process of developing. It will combine Wildlife course content and library skills. We are thinking of something along the lines of a modified review article.

We have six months remaining in our grant period. We must of course complete the development of the units. The program must be implemented and evaluated by students, faculty and librarians. We are also planning a workshop for SEL reference staff to familiarize them with the program. Office hours will be scheduled (during this trial year) for grant team members and science reference librarians to answer student questions, and help us to identify any problems with the assignments.

A performance exam was developed to help validate the objective test instrument. The test was developed by two members of the Library Instruction Advisory Committee and two grant project members. Thirteen performance test questions were designed to

validate corresponding objective test questions. Test items to be validated were selected by the skill or learning outcome which they measured. Also included was an unstructured "search" where students were asked to compile a bibliography on a selected topic consisting of eight citations, including four different types of materials. Each test sheet provides the question, a space for student answer, and a space to record the time it took to complete the question. Accompanying proctor sheets duplicate each test question, and provide direction for proctors to ask students specific questions about how they went about answering a performance test question. In some cases this was very necessary to determine if students understood the concept being tested, or to determine steps they took to answer the question. The proctor sheet also includes the steps a student must take to perform the task correctly.

Students were chosen by random sample from the pool of students who have taken the Library Research Proficiency Exam (533 at the time of the sample).

The results of this test have been compared to the objective test and are being analyzed with the help of a faculty member from the U of A Graduate Library School. These results will assist us in refining our objective test instrument. Because only four students from the School of Renewable Natural Resources have taken the objective test, we administered it independently to a selection of students from Wildlife, Fisheries and Recreation Resources.

Looking to the future we hope to use the results of this study to explore goals of both our Library Skills Program and upper level instructional programs; to use this process as a model for reaching out to other science departments; we will make use of our increased understanding of the organization and use of scientific literature; we will work toward continued validation and modification of our objective test instrument.

While we have a long way to go, we are already seeing benefits. Wildlife faculty have taken a new interest in overall library operations and services. Several of our model forms can be used now by librarians doing faculty and departmental outreach. We have developed a real working relationship with the SFL staff which should continue long after the grant period is completed.

Much of our progress is the result of a University Library which shows excellent support for instruction. There is strong administrative commitment. Staff members from throughout the system participate in the instruction program. Science-Engineering librarians, members of the Library Instruction Advisory Committee, have made very significant contributions to the study and as a result of this involvement we have a staff with a level of expertise and background of experience in library instruction which is quite impressive.

INFORMATION RESOURCES IN AGRICULTURAL RESEARCH[1]

Albert R. Mann Library
Cornell University

Joan K. Lippincott, Project Director
Jan Kennedy Olsen, Director, Mann Library
Bill Coons, Project Manager

Abstract

This paper reports on a study designed to explore appropriate information services for agricultural research faculty. The hypothesis is that if library services were made more convenient and accessible, use by researchers would increase. In this report, the background and rationale for the study are presented, the timetable and methodology are discussed, and preliminary data from the survey instrument are analyzed. Observations are made on the nature of services offered and the response of faculty.

INTRODUCTION

The grant that the Albert R. Mann Library received from the Association of Research Libraries was for the purpose of studying the information resource use pattern of faculty in the agricultural sciences. The hypothesis was that faculty seem to underutilize information resources in their research. They express concern about keeping up with the prolific number and variety of resources available. If library services were made more convenient and accessible, more like those of a special library, faculty would change their information resource use pattern. As an end result, which we did not attempt to measure in this study, it was hoped that the quality of agricultural research would benefit.

The components of the study were an initial survey of faculty concerning their use of information resources followed by a period of expanded and accessible services. At the end of the trial period, faculty were re-surveyed to evaluate the services and to measure whether their pattern of use of library resources had changed. A model of the kinds of services required by an agricultural research faculty would be developed.

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[1]From a presentation given at the Association of College and Research Libraries, Science and Technology Section program, American Library Association, Dallas, June 23, 1984.

The key personnel in this study were: Jan Kennedy Olsen, Director of Mann Library, who provided the original idea for the study, the conceptual framework for the project, and the financial and moral support needed to carry though the endeavor; Joan K. Lippincott, Head of Public Services at Mann Library, who coordinated staff involvement and provided guidance for overall activities; Bill Coons, Reference Librarian at Mann Library, who directed the day-to-day activities of the project and consolidated the questionnaires. In addition, James J. Zuiches, Associate Director of Research, College of Agriculture and Life Sciences, Cornell University and J. Paul Yarbrough, Professor of Communication Arts, College of Agriculture and Life Sciences, Cornell University, served as consultants on methodology and survey design.

In order to understand why a study of this type was undertaken at Cornell, it is important to have some background on the nature of the institution. The Albert R. Mann Library, a state-supported unit of Cornell University, serves the College of Agriculture and Life Sciences, the College of Human Ecology, the Division of Biological Sciences, and the Division of Nutritional Sciences. As the land-grant university for New York State, Cornell has a top-rated program in the agricultural sciences. With its collection of over 530,000 volumes, Mann is the largest academic agricultural library in the U.S. and the second largest library on the Cornell campus. Cornell is predominantly a research institution and has produced Nobel laureates and internationally-known experts in the sciences.

This study focused on the faculty of the College of Agriculture and Life Sciences (CALS), which includes 470 faculty in such diverse departments as Agricultural Economics and Animal Science. An important aspect of CALS's mission is to conduct research and disseminate the results to both the scientific community and the practicing farmer. The college has a highly developed research program; in 1982-3, over $40 million was spent in support of 792 research projects.

Several key factors furnished the rationale for this study. First, the general, undocumented observation that faculty are under-served in academic libraries provided a basis for concern. In a premier research institution, library service for faculty should add significantly to the research process. Second, few studies exist which measure faculty response to proposed services as well as existing services. As traditional modes of information retrieval change and some become obsolete, it is important that faculty are aware that librarians are willing and able to adapt their practices to new technology and can find creative solutions to deal with the information explosion. Third, some faculty may wish to change who performs some of their library tasks for them; library staff may be able to provide more efficient services than departmental assistants. Fourth, if the library is seen as indispensable by the faculty, it will have a powerful and influential lobbying group who will assist in funding new services. Fifth, in studying faculty response to new services during a trial period and in measuring attitudes and needs by means of a questionnaire, a model of services would be developed. The thirty-one other land-grant libraries in the Association of Research Libraries should be able to benefit from the model of services developed as a result of this study.

TIMETABLE AND QUESTIONNAIRE DEVELOPMENT

Generally, we were able to adhere to the plan of action and timetable developed at the beginning of the study.

PLAN OF ACTION AND TIMETABLE

ACTION	TIMETABLE
LITERATURE REVIEW	APRIL - SEPTEMBER, 1983
QUESTIONNAIRE DEVELOPMENT	SEPTEMBER - NOVEMBER, 1983
ADMINISTRATION OF FIRST QUESTIONNAIRE	DECEMBER, 1983
EXPERIMENTAL PERIOD OF ADDITIONAL AND FREE SERVICES	JANUARY - MAY, 1984
ADMINISTRATION OF SECOND QUESTIONNAIRE	MAY, 1984
ANALYSIS OF SURVEY RESULTS	JUNE - AUGUST, 1984
FINAL REPORT TO ARL	DECEMBER, 1984

The literature review focused on the process of scientific communication, with emphasis on modes of information-gathering by agricultural scientists, and the library's role in the information age. Two key sources were:

Busch, Lawrence and William B. Lacy. Science, Agriculture, and the Politics of Research. Boulder: Westview Press, 1983.

Matheson, Nina. "Academic Information in the Academic Health Science Center: Roles for the Library in Information Management." Journal of Medical Education (October, 1982) Part 2 (Supplement).

After most of the literature review was completed, work was begun on the design of the questionnaire. Our objective was to gather data on a number of issues: 1) What is the significance of the library's role in research/information gathering process? How does the library fit into the process of scientific communication? 2) What are the most significant services and materials the library can provide? Both existing and proposed services were included in the questionnaire. Attitudes of researchers would be compared before and after the trial period of expanded services. 3) How do researchers feel about the ease of access to library services? Would the trial period change attitudes towards ease of use? 4) Who should pay for new or expanded services? Are the services significant enough that researchers would pay directly or lobby to have funding through other sources?

In developing the questionnaire, we received extensive assistance from our methodology consultants. After numerous revisions, the questionnaire was tested on a small group before it was administered generally. Using a panel study technique, the first survey was sent to a random sample of 50% of the CALS faculty; the follow-up survey at the end of the project was sent to all faculty. The five-page (both sides) questionnaire was sent through the campus mail with a

cover letter and return envelope. On the initial survey, with one follow-up letter, we had an 80% response. At the time of this presentation, we are still receiving completed questionnaires from the second survey. Data in this talk are based on an interim 50% response. The questionnaire is included in the ARL Spec Kit No. 101 (1984), User Studies in ARL Libraries.

SERVICES OFFERED AND RESPONSE

The services offered during the semester-long experimental period were grouped into several categories. In some cases, the barrier that we removed was cost; a number of services we already offered were given free. In other cases, the service was a modification or expansion of something already offered or was entirely new.

Extensive consultations on research projects were offered to faculty. A reference librarian would prepare data and materials in support of a research project. Often online and hard-copy sources were searched and material were retrieved, packaged, and delivered by library staff. Projects included the topics of amphibian metamorphosis, anerobic digestion, and milk marketing regulations. In addition, several projects involved technical advice on manuscript preparation. The staff had not been involved in projects of this type before.

Information services included free computer searches (with limits imposed as necessary on a case-by-case basis) and an expanded search schedule. Normally searches are provided on a full cost recovery basis. One project included assisting a faculty member set up a personal bibliographic file on Sci-Mate. Several large bibliography projects were begun, including one on agricultural extension and diffusion of information and a comprehensive bibliography of monographs on cheese. Librarians had not complied bibliographies of this type before.

Two current awareness services that were already in place, distribution of tables of contents and automatic updating of computer searches (SDI's), were offered free during the semester.

Photocopy and document delivery services were expanded or made available free. One of the most popular new services enabled faculty to submit a printout or list and library staff found call numbers, paged materials, and photocopied them. If desired, staff filled out interlibrary loan forms to obtain off-campus materials. Photocopy service was provided free (within limits negotiated individually) and small jobs were completed on-the-spot, a service not formerly offered. Faculty were given the option of having books and photocopies hand-delivered to their office or lab; no formal intra-campus library delivery system for faculty exists at Cornell. The restriction on the number of interlibrary loan requests that could be submitted each week was lifted, and non-traditional suppliers were used through DIALORDER for some requests.

In general, the services offered were designed to open up the variety of activities provided by the library and to make access more convenient by removing barriers to use.

The services available to faculty were publicized and promoted through various means. Before the initial survey was sent out, public service librarians met with department chairs or library liaisons to explain the research project and the services that would be offered on an experimental basis. The questionnaire itself sensitized 50% of the potential users to the upcoming services. Several faculty were ready with large projects on the first day expanded services were begun. Early in the semester, a letter was sent to all eligible faculty explaining the project and providing a list of services offered. A brief notice of the project which we inserted in the CALS Research Newsletter led to one of the few problems we had in the course of the study; several individuals who received the newsletter but were not in our eligible population vocally demanded free services.

The use of services during the experimental semester, with a comparison to a year previous, is shown below. A total of 192 individuals, (41%) of the eligible population, used one or more services.

USE OF SERVICES DURING EXPERIMENTAL PERIOD

SERVICE	Spring 1984	Spring 1983
Special Projects/Research Consultations	11	0
Computer Searches	184	31
SDI's	12	N/A
Table of Contents	11	N/A
Photocopies	14,000	N/A
Document Delivery	30	0
ILL (Special Treatment)	55	0

We managed to keep up with the heavy demand for services by hiring some additional staff and by reorganizing some individuals' duties. Forty additional hours of student help per week were used in Reference for retrieval of call numbers, in Circulation for photocopy and document delivery, and in Interlibrary Services to free other staff to provide additional borrowing. Since analysis of service needs is considered an integral part of the duties of the Head of Public Services, her time devoted to the project was not considered an extra responsibility. The Reference Unit had recently added a new position and half of that individual's time was used to coordinate the daily activities of the project. During the semester of expanded activities, we had a full reference staff of six professionals and one support staff. Two newly appointed reference librarians were scheduled heavily at the reference desk in order to free the time of three experienced librarians who performed the bulk of computer searching. All reference librarians and the Head of Public Services worked on special projects.

SURVEY RESULTS

At the end of the trial semester of expanded services, a second questionnaire was administered. The figures reported below are preliminary data from the follow-up survey.

One segment of the questionnaire surveyed the information-seeking behavior of the faculty in order to determine what role the library has in the process of scientific communication. On a five-point scale ranging from "unimportant" to "essential," faculty were asked to rate twenty-six items for their importance in keeping current in their field. Over 50% of the faculty who responded rated the following sources "essential" or "very important":

HOW FACULTY KEEP CURRENT IN THEIR FIELD

ACTIVITY	PERCENT
READING JOURNALS IN THEIR FIELD	89%
USING THEIR OWN COLLECTION OF MATERIALS	69%
ATTENDING CONFERENCES OR PROFESSIONAL MEETINGS	66%
CORRESPONDENCE AND DISCUSSION WITH COLLEAGUES OUTSIDE THE UNIVERSITY	63%
LOCATING CITATIONS REFERENCED IN BOOK AND JOURNAL BIBLIOGRAPHIES	59%
CORRESPONDENCE AND DISCUSSION WITH COLLEAGUES WITHIN THE UNIVERSITY	56%

As was expected, emphasis on personal contact (the invisible college) was strong and use of individuals' own collections was significant. Two items, reading journals and locating citations, presumably related at least in part to library use. Of the choices given, items rated unimportant by a high proportion of faculty included reading experiment station reports, browsing in bookstores, and looking in the library's card catalog.

In a question asking faculty to rate the importance of twenty current and proposed library services, 50% or more of the faculty rated the following services "essential" or "very important".

SERVICES HIGHLY RATED BY FACULTY

SERVICE	PERCENT
CHECKING OUT BOOKS AND OLDER JOURNALS	62%
ABILITY TO PHONE IN, ASK A QUESTION, AND RECEIVE A QUICK, INFORMATIVE RESPONSE	56%
HAVING MATERIALS PHOTOCOPIED IMMEDIATELY	55%
AVAILABILITY OF REFERENCE LIBRARIANS FOR PROFESSIONAL CONSULTATION	55%
AVAILABILITY OF COMPUTER SEARCHES IN THE LIBRARY ON DEMAND	54%
SELF-SERVICE PHOTOCOPYING	51%
OBTAINING MATERIALS QUICKLY FROM SOURCES OUTSIDE CORNELL	51%

While one of the most traditional services that we offer, checking out materials, ranked highest, it is interesting to note the importance of services requiring personal consultation with a reference librarian (ability to phone in with questions and availability of reference librarians for consultation).

Over 50% of the faculty rated the following services "unimportant" or "somewhat important".

SERVICES LESS IMPORTANT TO FACULTY

SERVICE	PERCENT
AVAILABILITY OF COMPUTER SEARCHES RUN BY A LIBRARIAN IN THEIR OFFICE	74%
DELIVERY OF LIBRARY MATERIALS FROM OTHER CAMPUS LIBRARIES TO THEIR OFFICE OR LAB	62%
ACCESS TO PERSONAL COMPUTERS IN THE LIBRARY'S MICROCOMPUTER CENTER	59%
DELIVERY OF MANN LIBRARY MATERIALS TO THEIR OFFICE OR LAB	57%

Three of the four items provided evidence that physical convenience of services was not a concern of most faculty. When we initially planned the project activities, we thought that a delivery service would be very popular. The initial survey alerted us to the possibility that this might not be the case, and practical experience showed that it was not a heavily used service during the experimental semester. While at first the response to the question on microcomputers seemed surprising, we realized that faculty who needed extensive use of a microcomputer would have one in his or her office or lab.

A survey question attempting to determine reasons that individuals do not use libraries yielded inconclusive results. In fact, a resounding 74% of those surveyed strongly disagreed with the statement "I don't need to use the library". The strongest response to why people don't use libraries came from the 53% who said that they depend on their own collection of materials.

Preliminary analysis of questions pertaining to who should pay for various services showed that faculty were content with the patterns that are currently in place. They feel that their research budget (direct costs) should pay for photocopying, computer searches, and giving the library a list of items to retrieve. They feel the library should cover the expense of items obtained through interlibrary loan.

In addition to the data gathered through the surveys, we learned a number of things through practical experience. The project had excellent promotional value. Many faculty were unaware of many existing services. The need for a systematic and periodic promotion effort was clearly evident.

The increased level of personal contact with faculty led to a heightened appreciation of librarians' skills on the part of the faculty and a feeling of strong professional worth on the part of the reference librarians. We discovered that many researchers like, want, or need very large literature reviews and often maintain large personal files of documents. While many reported in the follow-up survey that they would have scaled down their information requests had they had to pay for services, this reflects more on the negative impact that service costs have on the research process than it does on a faculty member's abuse of free services.

Overall, we did indeed feel that the ease of access and expanded services made a difference to a number of researchers. The following are comments from the follow-up questionnaire:

"The additional services made a big difference in my utilization of the library. I went more often and obtained more information more quickly."

"The free services allowed me to try a different approach to literature searches that I would not otherwise have considered. It was successful enough that I would request money for it in future research funds."

"I think the service was excellent and my productivity was enhanced because of it."

"The initiative on the part of library personnel has caused me to 'update' my library usage. The spring project helped me to break out of card catalog, book and journal retrieval pattern, to see much richer possibilities for research."

FUTURE DIRECTIONS

Much analysis of the data remains to be done. Only a few questions were analyzed in preliminary fashion in order to prepare for this talk. Future analysis will include a comparison of researchers' attitudes before and after

the services were offered and will correlate the attitude towards the perceived importance of services and the willingness to pay.

The results of the survey and the practical experience of the trial semester will have a definite impact on the direction of library services at Mann. We will institute a continuing mechanism whereby faculty can submit lists or printouts for document retrieval and photocopy; fees will be charged. Increased attention will be given to the problems concerning management of personal files. In fact, we have already offered two workshops on using a microcomputer for personal file management; forty faculty attended and twenty-four were on a waiting list. We will continue to maintain our high standards and liberal use policies for traditional library materials. Non-traditional means of document retrieval will be used increasingly. We will consider continuing to provide a certain amount of service free to faculty for promotional purposes.

After continued study of the survey results and interviews with faculty, a model of services appropriate to agricultural researchers will be developed. Some of the components of that model are beginning to take shape. A predominant theme is the establishment of relationships in which librarians and researchers work together on a collegial and consultative basis. The librarian has a significant role as a consultant in new information technologies and as an expert in organizing and managing information. The model will also include a strong promotional component so that faculty will understand the existence and value of services the library offers. The model of services will remove as many barriers to access as possible in order that all researchers may benefit from the information, materials, and services the library has to offer.

THE INVISIBLE USER: USER NEEDS IN AN ELECTRONIC ENVIRONMENT

University of Illinois at Urbana-Champaign

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Abstract

The development of inter-active communication systems coupled with microcomputers and computer terminals has created new challenges for public services in academic libraries. Data collected in a needs assessment survey is examined to ascertain if users of computer-based systems have different needs and expectations for public services from individuals who do not regularly use such systems.

While there can be little argument that computers are changing the nature of library service, it may be less clear that the evolving character of automation itself appears to be bringing about significant changes in the ways in which people can use the library and its resources. The advent of the relatively inexpensive but powerful microcomputers and the ability to connect these microcomputers to inter-active communication networks now allow radically decentralized access to library databases.

At the University of Illinois at Urbana-Champaign, we have begun to explore the degree to which librarians can develop and provide both appropriate and effective public services in this new decentralized context. What concerned us most was the realization that so much of our perception of patron needs, and consequently the kinds of services we were providing, was limited to our interaction with patrons within the traditional library context. Even where large mainframe computer systems have been used in libraries, such as automated circulation systems and online catalogs, the majority of patrons are required to come into the library to use the terminals to access the system. Assisting users to locate items in the automated systems and instructing them in the use of those systems as well as the ongoing and more traditional interactions of reference and circulation helped librarians keep in touch with patrons' needs and problems.

However, as microcomputers and terminals have become more and more common in both the office and home, and demand for end-user searching capability and more dialup ports to our online circulation system (LCS) has continued to grow, we began to get the uneasy feeling that the library might be losing touch -- or perhaps had never gotten in touch -- with an important and possibly sizeable user group. Although the library had already

offered remote access to LCS via the telephone, with the library's phone center staff searching the LCS database, the addition of dialup ports created an environment in which staff interaction is unnecessary. For instance, a patron with a home or office microcomputer or terminal at the University of Illinois can dial into the LCS database, search the library's holdings and remotely request a book be delivered to an office or dormitory. We were also aware that vendors of bibliographic search services have been increasingly focusing their appeal to the home market. Consequently, we began to wonder if there might be a growing population of library patrons who were active library and information users but who seldom or never interacted with a librarian or even came into the library. These individuals, who access information and library resources electronically rather than through conventional means and whom we dubbed "invisible users," became the target of a study to determine who are these people, how numerous are they, and what are their information gathering habits.

The basis of this exploration was a study, funded by the Office of Management Studies of the Association of Research Libraries, undertaken in the spring of 1984 at the University of Illinois at Urbana-Champaign by the members of the Departmental Library Services Director's Council. The purpose of the study was twofold. First, we sought to find out more about this group of possible "invisible users," their use patterns and information needs, and how they might differ from more traditional users. Second, our methodological design was to explore the use of an online mechanism for survey purposes with a possible follow-up and refinement of the survey data through computer conferencing, using the computer to structure, store, and process written communications among a network of individuals.

The vehicle for the first phase of the study was a needs assessment survey questionnaire. Questions centered on four areas: demographics of the user population, computer resources and use patterns, methods of currently accessing information, and types of information enhancements they would like to have the library provide. After pre-testing, the questionnaire was both mailed to a stratified random sample of 1,200 teaching faculty (to ensure a representative distribution from the sciences, the humanities, and the social sciences) and also mounted on the University of Illinois' PLATO system and the campus' primary mainframe, the CYBER 175, to which faculty and students have easy access, using either available software or their own programs. Six hundred and fifteen usable paper questionnaires were returned plus those from four individuals who reported that they had already responded electronically. The online questionnaire was completed by 71 CYBER and 37 PLATO users out of a population of unknown size, but certainly numbering in the thousands. The lower response rate to the online questionnaire can be in part explained by the inability of the system to notify users as they signed on that the library's questionnaire was available. Only those who

checked an online bulletin board were aware of its existence. The questionnaire appears in ARL Spec Kit 101.

The responses from both the printed and online questionnaires were coded and analyzed using the SPSS software. Data were analyzed by discipline (humanities, sciences, social sciences) and by method of response (mail, CYBER, PLATO). Because of the small number of PLATO responses, those data have not been analyzed at this juncture of our research. The data discussed in this paper are limited to the preliminary analysis of the descriptive data in terms of the method of response to the questionnaire.

These preliminary findings indicate that there are few variations regarding access to computer facilities at the University of Illinois at Urbana-Champaign (Table 1). At least

TABLE 1

Types of Computer Access

Computer Use	CYBER (N=71) Rank order in ()	Mail (N=615) Rank order in ()
Access to Terminal	97.2% (1)	68.1% (1)
Use the CYBER Mainframe	97.2% (1)	49.8% (3)
Have a Microcomputer in Office	77.5% (3)	32.0% (6)
Access to a Modem	74.6% (4)	46.0% (5)
Access to Microcomputer in Department	71.8% (5)	46.5% (4)
Access to Microcomputer	63.4% (6)	59.8% (2)
Use the IBM Mainframe	60.6% (7)	20.5% (8)
Microcomputer at Home	47.9% (8)	26.5% (7)
Use Microcomputer in Another Location	42.3% (9)	8.1% (11)
Microcomputer in Laboratory	29.6% (10)	16.7% (9)
Use Other Mainframe on Campus	28.2% (11)	7.3% (12)
Use PLATO	25.4% (12)	13.5% (10)
Use a Mainframe off Campus	15.5% (13)	7.2% (13)

68% of all respondents have means to access some type of computer facilities. Although the ranking of the means of access for CYBER users differs in some respects from the mail respondents, their level of access to computers is noticeably higher in every category.

Differences do appear in respect to the use of that hardware (Tables 2, mainframe use, and 3, microcomputer use). Despite the influx of microcomputers, among faculty there is greater access to and heavier use of a mainframe for most activities except for word processing; more than twice as many mail respondents indicate using a microcomputer for that task; however, more CYBER people use word processing on a mainframe. Personal management is also an exception.

TABLE 2

Computer Activities Using a Mainframe

Activity	CYBER (N=71) Rank order in ()	Mail (N=615) Rank order in ()
Personal research	78.9% (1)	18.5% (2)
Programing	74.6% (2)	10.2% (4)
Data Analysis	67.6% (3)	20.5% (1)
Word Processing	56.3% (4)	10.1% (5)
Conferencing/Electronic Mail	52.1% (5)	4.6% (9)
Instruction	45.1% (6)	11.9% (3)
Machine Readable Data Files	39.4% (7)	6.3% (6)
Graphics	39.4% (7)	5.2% (8)
Modeling	33.8% (9)	6.0% (7)
Administration	21.1% (10)	2.6% (10)
Games & Amusement	21.1% (10)	.3% (13)
Personal Management	16.9% (12)	1.6% (11)
Creative Work	9.9% (13)	.5% (12)

Those who responded electronically on the CYBER mainframe, also, obviously preferred the mainframe except for doing personal management and creative work. The same tasks for CYBER users as for other users generally appear as the top five activities on both microcomputers and mainframes: namely, personal research, word processing, programming, data analysis, and instruction. Using a computer for instruction is not reported as often by CYBER respondents as by the overall group. CYBER people also use conferencing/electronic mail more than others.

TABLE 3

Computer Activities Using Microcomputers

Activity	CYBER (N=71)	Rank order in ()	Mail (N=615)	Rank order in ()
Personal research	57.7%	(1)	20.3%	(2)
Programing	50.7%	(2)	12.8%	(3)
Word Processing	42.3%	(3)	32.2%	(1)
Data Analysis	33.8%	(4)	12.4%	(4)
Machine Readable Data Files	25.4%	(5)	5.2%	(7)
Personal Management	25.4%	(5)	5.0%	(9)
Instruction	23.9%	(7)	9.6%	(5)
Graphics	19.7%	(8)	6.5%	(6)
Games & Amusement	19.7%	(8)	2.8%	(12)
Modeling	14.1%	(10)	4.7%	(10)
Conferencing/Electronic Mail	12.7%	(11)	3.1%	(11)
Administration	11.3%	(12)	5.2%	(7)
Creative Work	14.1%	(13)	1.1%	(13)

However, when the percentage of actual use is calculated, the CYBER respondents are markedly heavier users of computer facilities. When the figures are broken down by activity, 57% of CYBER respondents spend time on personal research using a

microcomputer as opposed to only 20% for the mail population of microcomputer users. Even though there is widespread availability of computer access on campus, those who used the machine to respond to the survey constitute a group who are, indeed, much heavier computer users for both mainframe and microcomputer activities.

Generally speaking, at least 50% of the respondents spend under two hours a week performing the various tasks on a microcomputer, whereas the spread of hours is a little broader on a mainframe. The exception is word processing where 50% of the users spend four hours doing word processing on a mainframe as opposed to between four and five hours on a microcomputer.

Next the questionnaire asked how the respondents presently access information. When the responses are compared in terms of the format by which the faculty answered we discover that our heaviest users of computer facilities, those who responded on CYBER, tend not to have a commonality with the other respondents. While the CYBER group also prize their personal libraries and avail themselves of many traditional library services, they are more frequent users of LCS rather than the card catalog. Although searching commercial databases does not rate highly with them, these CYBER respondents indicate more use in the library of online databases than do any other group. The CYBER respondents consult a colleague or a librarian less frequently than do the rest of the sample population. CYBER users seem to locate information through automated systems while the others in the sample are more frequent users of more traditional means of access.

In addition to finding out how people access information, the respondents were also asked to indicate the importance of each method of access. Using a three point scale with three representing most important, scores were averaged to determine the ranking of the responses (Table 4). Answers by method of response brought to light several marked differences between those individuals who replied via the paper questionnaire versus CYBER. When the number of responses regarding the use of the card catalog are examined, the CYBER respondents are not as enamoured of this means of access to information as is the mail questionnaire group, reinforcing our observations about the information-seeking practices of library users who also use computers. When Cyber respondents are compared with the mail respondents, LCS use inside and outside the library is regarded very highly by relatively more CYBER respondents than others, regardless of discipline.

Another set of questions asked respondents what improvements in library service would be most important to them. The enhancement questions are of three kinds: improvements of the library's current automated service (LCS questions), enhancements of vendor services (commercial online database questions), and new library-based services (24 hour reference service, electronic reserves, online interlibrary loan).

TABLE 4

Importance of Accessing Information by Method of Response

Source Used	CYBER Rank order		Mail in ()	
LCS in Library	2.64	(1)	2.31	(4)
LCS Outside the Library	2.63	(2)	2.05	(9)
References in Books and Journals	2.63	(2)	2.62	(2)
Own Materials	2.61	(4)	2.72	(1)
Indexes and Abstracts	2.34	(5)	2.29	(6)
Online Databases Outside the Library	2.25	(6)	2.05	(9)
Colleague	2.21	(7)	2.21	(5)
Library Reference Tools	2.10	(8)	2.15	(8)
Card Catalog	2.04	(9)	2.44	(3)
Library Staff	1.97	(10)	1.98	(11)
Online Bibliographic Databases in Library	1.95	(11)	2.18	(7)
Browse Bookstacks	1.87	(12)	1.95	(12)

Table 5 illustrates that CYBER respondents again constitute a unique group. They share an interest with others in having more LCS terminals available throughout the campus and more dialup access. In addition, online 24 hour reference service and the ability to request interlibrary loan materials appeal to these users. While obtaining information with the aid of a library staff member is only of moderate concern, there is substantial interest in using a computer-based communication system to reach that staff. Also of importance is interest in the library's offering more commercial bibliographic databases and providing training so they can search the databases themselves. Beyond just a different set of interests, it should be noted that the intensity of response for enhanced services is often much greater. Among the CYBER users the five most important enhancements rate higher than the top choice of the mail respondents.

TABLE 5

Enhancements for Improved Services by Method of Response

Enhancement	CYBER Rank order		Mail in ()	
More Dialups to Library Systems	2.51	(1)	1.91	(3)
24 Hour Online Reference Service	2.29	(2)	1.54	(9)
More Online Bibliographic Databases	2.19	(3)	1.64	(7)
More LCS Terminals in Dispersed Locations	2.11	(4)	1.99	(2)
Online Interlibrary Loan Request	2.06	(5)	1.53	(10)
Training To Do Own Online Database Searching	2.04	(6)	2.00	(1)
More LCS Training	1.99	(7)	1.82	(5)
More LCS Terminals in Central Locations	1.96	(8)	1.88	(4)
Electronic Reserve System	1.93	(9)	1.67	(6)
Higher Baud Rate for LCS Terminals	1.71	(10)	1.24	(13)
More Printers for LCS	1.64	(11)	1.60	(8)
Machine Readable Data Files	1.50	(12)	1.20	(14)
Online Services, e.g. The Source	1.49	(13)	1.47	(11)
Terminals for Loan	1.32	(14)	1.31	(12)

Having completed the initial examination of the user needs study, we are now in the process of statistically analyzing the data, both by frequencies and cross-tabulations. The next phase of the project will be to pursue the results of these findings in more detail through computer conferencing using the CYBER and PLATO systems. In this way, questions posed in the user needs study can be more thoroughly explored through an open-ended questioning process. By using computer conferencing as the means of follow-up, it also will be possible to test the potential of electronic communication between librarians and users. The final phase of the project will be to develop a descriptive model that will define methods of service to "invisible users" within the context of the electronic environment in which they function.

While the analysis of our data is still too preliminary to propose a new paradigm for public services, we believe that these findings do raise certain important questions concerning possible future directions that public services might take because of the impact of electronic systems upon library users. Currently, the environment within libraries is one of traditional manual operations being selectively enhanced by automated systems to provide user services as well as performing traditional day-to-day processing activities. With few exceptions, the computer-based systems in libraries have been designed to convert existing library files, e.g., the card catalog, and circulation records, into machine readable form. These exercises in rudimentary automation have been designed primarily within a management, rather than a user framework. If the user has been considered, it has usually been within the context of minimally enhancing existing systems rather than developing new ones. That these systems actually represent a traditional library paradigm is quickly ascertained by the lack of flexibility or expandibility of these applications of automation. The cathode ray tube has merely replaced the catalog tray.

In such an environment, it is difficult to determine if the methods by which people access information are changing. The respondents to the mail questionnaire are individuals who, in fact, do live in a very active, mixed manual and automated library environment. Yet, they value the methods by which they access information in virtually the same ways confirmed by every other user needs study of the last 30 years. Where variations occurred within the sample, these differences are readily explained by the normal discrepancies that exist between the manner in which scientists, social scientists, and humanists access information. However, by mounting the questionnaire on the University's mainframe CYBER, we discovered a population that responded in some ways differently to the questions of information access than both our own and previous studies of traditional library users. CYBER users are more inclined to use LCS, the library's enhanced online circulation system, for known item searching rather than using the card catalog. Especially noteworthy is that a user of CYBER is more likely to search online databases outside the library and twice as likely to access LCS from a terminal outside the library as a non-CYBER user. They are less inclined to consult librarians than the non-CYBER user. Corroboration of this decentralized information model is evidenced by their responses to the improved services section of our questionnaire. These CYBER users' preference for dialup access to LCS, 24 hour online reference service, and more online databases, is more favorable than their colleagues who responded by mail questionnaires. Here ther was the "invisible user".

If these users do exist with a different model for accessing information and different expectations of what library services should be in the future, how are we in libraries going to serve them? While not necessarily siding with the pundits of a

paperless society, we would like to make a few suggestions for a model of service for the growing number of individuals who are able to access information electronically. None of the following, however, denies or precludes the need for traditional library service as it now exists.

If the information needs of this new clientele, the "invisible user," are to be served, it is essential that the concept of centralized user access be carefully scrutinized. For the type of user identified as actively involved in computer-based systems, it is highly questionable that a centralized library without any decentralization is going to serve that individual effectively. We may seriously question if requiring these users to leave their offices or homes for library services is a valid way in which to serve them, but is not such a decentralized model with its time and distance independence at the heart of the concept of the "electronic cottage"?

What then can public services librarians do to improve services to the "invisible user"? Automated circulation systems and online catalogs must have the capability to extend outside the walls of the library, and these systems must be able to expand to accommodate access by the individual user, either by telephone dialup or another type of network connection. It is dubious to refer to a system as "user-friendly" if it provides access only within the confines of a single building for a limited number of hours each week. Many of the current library automation systems strongly reflect management needs rather than user needs. Even within a system like LCS which allows usage outside the confines of the library, we see a continual flow of requests for more dialup ports.

Beyond assuring that current library technology will be available to the user who can access systems electronically, libraries need to link to computer-based communication networks. Within the framework of academia, there is a growing concern by universities and units therein, such as Colleges of Engineering, to develop these computer networks. Such networks which link computers to each other provide an excellent opportunity for libraries to participate in systems which are actively used by "invisible users." Library automated circulation systems and online catalogs should be able to interface with these systems. More importantly, such a unified system should include an electronic mail capability which will allow librarians an effective and appropriate avenue of communication with "invisible users." Our questionnaire alluded to at least two possible applications for using an electronic mail system. One was the ability for faculty to place materials on reserve for courses via the computer. Using the electronic mail capability, the faculty member could call up a standardized form that s/he would fill out on the computer. Each reserve request item would automatically interface with the online circulation system to determine if the item was owned and available. If available, it would be paged for

reserve and the request incorporated into an automated reserve system with an electronically produced status report routinely generated to the requestor.

Most reference queries in academia can be defined as either data oriented or citation oriented. An online 24-hour reference system could be made up of two components which would fulfill these two types of queries. To meet, at least partially, the needs of the data oriented query, a reference database, similar to the reference question files which many reference desks now maintain, could be constructed to provide answers and sources for the most frequently asked questions. Citation oriented questions could be answered through an electronic mailbox. The "invisible user" could leave messages and reference queries that would be responded to at a later time when the librarian checked his or her mailbox. This approach has particular appeal in a world in which reference librarians have irregular hours and/or at least some of the patrons work at hours when the library is not open.

These examples represent only two possible ways in which the "invisible user" might be served. Such scenarios, if they are brought to fruition, would reinforce the "invisible users'" chosen isolation from the physical library but would not isolate them from the librarian. It is important to understand that the "invisible user" is very concerned with information access and is desirous to have the librarian be a part of that process. However, if librarians choose to ignore this group of users, they in contrast to previous disaffiliated patrons, have the potential to build information systems of their own and access systems without using the librarian as an intermediary. It, therefore, behooves us at least to incorporate this group of users into any model of service which we might develop. For it is certain, that the "invisible user," like the computer, is going to be with us for a long time.

NON-USERS OF THE MSU LIBRARIES:

AN ASSESSMENT OF CHARACTERISTICS, PERCEPTIONS, AND NEEDS

MICHIGAN STATE UNIVERSITY

Terry Link, Project Director
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ABSTRACT

A survey questionnaire was designed to elicit information rearding the non-use of an academic library by members of that academic community. The survey instruments were administered by telephone to a stratified systematic sample of students and faculty at Michigan State University. 1269 students were interviewed and approximately 250 faculty members will have been interviewed by the completion of this study. Preliminary results of the student survey are not conclusive but some data is included. Approximately 190 faculty members have been interviewed at this time. No data is available.

In a period of budget cuts, declining enrollments, and information explosion most academic libraries are having a difficult time simply trying to continue the level of service that has been traditional in an academic research library. Why would anyone want to add to their burden by chasing after those potential users who currently fall into the category of non-users? The increase in workload that might be generated by a successful outreach program could entail more burnout or a necessary drop in the quality of service.

At Michigan State University Libraries we ask ourselves this question even as we pursue the elusive non-user. The genesis of our study was brought about by the desire to understand why it is that some members of an academic research university do not avail themselves of the services, resources or facilities of the university libraries. At MSU we have one of the largest single campuses in the United States serving a student population of more than 35,000 with nearly 3,000 faculty members. Our library system includes a large central library with 15 satellite branches, most of which specialize in the sciences. Entering the Main Library for the first time is startling for almost anyone but it is especially so for many freshmen, transfer students and

foreign students. Each fall nearly 10,000 new students come to campus who have never tried to deal with a library system of our size and complexity. It is no surprise then that we at the reference desk will hear patrons tell us they don't know where to begin. Likewise it is not uncommon for us to hear from graduating seniors that during their last term on campus they are in need of using the library for the first time. "I have managed to go through 4 years without having to use this place", they brag. A recent study done here to discern how successful patrons were in finding what they needed found that a substantial number of patrons use or attempt to use the library without ever asking for assistance. How many persons leave the library overcome by its size and complexity never to return again? How aware are the members of our academic community of our services, resources, and facilities, and does this effect their non-use of the libraries? Who are the non-users and what characteristics do they share? Why are they non-users? What information needs do they have? What role do they think the library should have in meeting those needs? And where do they get their information?

These are the questions we sought to answer upon beginning this study. Underlying this research is a fundamental belief that we in academic libraries must attempt to meet the needs of our community in the same fashion that public libraries attempt to meet the needs of their diverse communities. To do so requires that needs must be determined. Perhaps we already know best what the needs of our users are, in which case a survey of this nature is not warranted. But honesty tells us that perhaps we are wrong in our professional assessment of needs and that we really should seek to determine those needs by asking the potential users themselves.

We began by reviewing the literature on non-user studies. Not surprisingly there is little that has been reported regarding non-users of academic libraries. John Lubans did two studies, one at Rennsalaer Polytechnic Institute in 1970 and the other at the University of Colorado in 1971-72. Nurieh Musavi also did one in 1975 at Carlow College in Pittsburgh. All three previous studies were on a much smaller scale than the one we had thought of doing. Each study used different approaches to determine who the non-users were. Luban's study at Rennsalaer found that library use was strictly course-related and that student use seemed to be affected most by the amount of time students felt they had. At the University of Colorado, Lubans found little difference in the opinions of users and nonusers. Musavi found that users (1) were more aware of resources and services; (2) had better library skills; and (3) had a more positive attitude toward libraries than non-users. She further hypothesized that "library non-users may have been part of a large college facility non-use syndrome".

[Lubans, John, Jr., "Nonuse of an Academic Library," College and Research Libraries, September 1971, pp. 362-367; Lubans,

John, Jr., "Library-use Instruction Needs from the Library Users'/Nonusers' Point of View: A Survey Report," in Lubans, John, Jr., Educating the Library User, New York, R.R. Bowker, 1974, pp. 401-409; Musavi, Nurieh, "Users and Non-users of College Libraries" (Ph.D. dissertation, University of Pittsburgh, 1977).]

Building on the efforts of these researchers and with the help of two consultants, Dr. Philip Marcus, director of MSU's Social Science Research Bureau, and Dr. Charles Ostrom, Associate Professor of Political Science, we devised a study that we thought would give us reliable data for answering our questions. Our first problem was trying to identify a quick reliable means of predetermining who was a non-user. The idea to match university enrollment and employment records versus registered library users was discussed and ruled out for fear that there well might be persons who were registered on our library system who were by all definitions non-users and thus would be excluded from the sample. The next alternative was to do a large enough random sample of the entire university student body and faculty so that we might extract reasonably reliable data. We chose this method and designed the survey to reach 1500 students and 250 faculty. The faculty sample consisted of approximately a 10% sample. The student sample was stratified along college and rank based on current enrollment data. The faculty sample was stratified along college, rank and tenure versus non-tenure status based on current employment records. We discussed using a mailed questionnaire, doing more limited in-depth interviews, and doing a telephone survey. We settled on the telephone survey figuring that many of the people who may be nonusers may well be the type who would never return the questionnaire and that in-depth interviews would be impossible to do for so many.

The construction of the student questionnaire went through at least 16 substantive drafts with an additional number of minor revisions in between. We pretested sample questionnaires on three occasions using 20-30 persons for each pretest. The major difficulties were (1) wording the questionnaires so that they could be coded on computer data sheets for easier analysis; (2) getting the language to read well over the telephone; (3) keeping the questionnaire short enough to prevent frustration on the part of the respondents; (4) making sure that we provided for all reasonable responses; (5) whether or not to prompt for answers or simply attempt to code an unprompted response; and (6) whether or not to obtain information on library usage from those interviewees who were self-declared users.

The final student questionnaire consisted of 18 questions. Additional data - college of enrollment, rank, sex and residency (on-campus versus off-campus) - were taken from university records as part of the sampling technique. Interviewers were

hired and trained utilizing underemployed student library workers where possible. Training consisted of a one hour session, plus two practice telephone interviews for each interviewer.

The student survey was administered during the first three weeks of classes during the 1984 Spring term. Telephones in our technical services department were used during evening hours (5:30-9:30pm Sunday thru Thursday) to contact the preselected students. Data was recorded on computer-readable data sheets by the interviewers. A grid, designed by the campus computer center, was used to assure greater ease and accuracy in coding. Interviews averaged 12-15 minutes each.

The final faculty questionnaire paralleled the student questionnaire in most cases. Some additional data was sought as long as we had a captive audience. In addition, the smaller sample permitted us to ask a few open-ended questions, e.g., "What resources if any do the MSU libraries not own that you think we should?" The faculty questionnaire was pretested in two different forms among 10-15 faculty before a final version was decided upon. The final faculty questionnaire consisted of 24 questions. Additional data garnished from university records as part of the sampling technique included sex, length at the university, college, rank, and status (tenure versus temporary).

PRELIMINARY RESULTS

At the present time the only available data are the marginal scores from the student survey. The number of completed student interviews was 1269. Although the marginals do afford some interesting information regarding our users and non-users further analysis should allow us to determine the best predictors for use and non-use of the MSU libraries. Our future analyses will include factor analysis and application of Guttman scales to determine relationships of variables as well as the predictability of certain behavior associated with other variables. For example if a senior indicates that he/she uses the library more than once a week is it likely that they rarely ask for assistance or do they ask for assistance more than those who use the library only a couple of times a term? Further analysis will include a thorough look at the data collected from the faculty survey and correlations between the two sets of data will be run. We also plan to create indices of knowledge regarding library resources and services. These indices will be cross-tabulated against other variables to determine any possible correlation. What follows are selected tables constructed from the marginals available from the student survey.

LIST OF LIBRARIES ON MSU CAMPUS USED BY STUDENTS (N=1269)*

MAIN LIBRARY	85.7%
BUSINESS LIBRARY	14.6%
CONRAD LIBRARY	10.5%
ENGINEERING LIBRARY	6.8%
MATHEMATICS LIBRARY	4.3%
PHYSICS AND ASTRONOMY LIBRARY	2.6%
CHEMISTRY LIBRARY	2.5%
CLINICAL CENTER LIBRARY	2.0%
MUSIC LIBRARY	1.6%
VETERINARY CLINIC LIBRARY	1.1%

* Libraries listed had at least 1.0% of students in sample reporting use.

LIST OF PLACES IN THE MAIN LIBRARY WHERE STUDENTS ASK FOR HELP*

REFERENCE DESK	78.1%
INFORMATION DESK	67.8%
ASSIGNED READING DESK	49.1%
CHECKOUT DESK	29.4%
CIRCULATION DESK	28.2%
SHELVERS	20.2%

* (N=1111)

FREQUENCY OF LIBRARY USE BY STUDENTS DURING A TYPICAL TERM*

MORE THAN ONCE A WEEK	37.2%
ONCE A WEEK	22.6%
EVERY OTHER WEEK	19.2%
COUPLE OF TIMES A TERM	17.9%
NEVER	3.1%

*(N=1269)

WHAT DISCOURAGES STUDENTS FROM USING THE CAMPUS LIBRARIES

CROWDEDNESS	55.2%
PARKING	40.0%
NOISE	38.0%
TOO MANY DEMANDS ON MY TIME	36.3%
COMPLEXITY	32.2%
MISSING MATERIALS	28.1%
LACK OF SEATING	27.1%
LOCATION	20.5%
IRRELEVANT TO COURSEWORK	18.4%
LIBRARY RULES & POLICIES	13.5%
* PIPED-IN MUSIC	12.4%
NOT ENOUGH MATERIALS	10.6%
CONCERN ABOUT SECURITY	9.5%

* There is no piped-in music in the campus libaries.

PRINCIPAL USES MADE OF THE MSU CAMPUS LIBRARIES

USING LIBRARY MATERIALS IN LIBRARY	89.5%
USING COPY MACHINES	82.2%
STUDYING	77.5%
GET HELP FINDING INFORMATION	72.2%
CHECKING OUT LIBRARY MATERIALS	69.7%
USE ASSIGNED READING	68.7%
USE AUDIO-VIDEO MATERIALS	43.4%

TYPES OF ASSIGNMENTS GIVEN TO STUDENTS WHO ARE EXPECTED TO USE LIBRARIES(N=843)

USE ASSIGNED READING	70.7%
WRITE SHORT PAPER	63.4%
READ JOURNAL ARTICLES	60.8%
WRITE TERM PAPER	56.0%
PREPARE ORAL REPORT	30.5%
WRITE BOOK REVIEWS/REPORTS	30.2%
LISTEN TO OR REVIEW TAPES	21.2%
WRITE LAB REPORT	18.1%
COMPLETE LIBRARY WORKBOOK	8.0%

TYPES OF INTELLECT USE EXPECTED OF STUDENTS

INTERPRET FACTS	94.9%
SOLVE PROBLEMS	89.9%
SYNTHESIZE DIFFERENT FACTS/POINTS OF VIEW	87.6%
LEARN OR MEMORIZE FACTS	79.2%
CRITICIZE WRITTEN MATERIALS	68.8%

IMPORTANCE OF LIBRARIES TO STUDENTS AND FACULTY IN THEIR RESPECTIVE SUBJECT AREAS

EXTREMELY IMPORTANT	47.1%
VERY IMPORTANT	38.7%
SOMEWHAT IMPORTANT	11.4%
SLIGHTLY IMPORTANT	2.3%
NOT IMPORTANT AT ALL	.5%

A Comparison of Two End User Operated Search Systems

Charles Gilreath, Jane Dodd, and Geraldine Hutchins
Texas A&M University Library

New end user services which provide a user friendly interface to large database systems and allow users to conduct literature searches using a simplified protocol are being developed by vendors such as BRS and DIALOG. These systems are designed with some form of cost savings, either by providing services at reduced rates during off-peak hours or by having part of their system available to structure search logic offline prior to online connection. The principal audience for such systems is clearly the end user, the person who has a home computer and the desire to use a large information retrieval system to find literature on his own. The possibilities for libraries to make effective use of such systems are, however, equally great; and in fact, some might argue that academic libraries in particular may have a very important role in familiarizing their clientele with the possibilities such systems provide. Before libraries consider adding such services, however, they need to determine the impact these services will have on both patrons and staff. This project was undertaken as a means of beginning to determine some of those impacts.

The investigators compared two systems, Bibliographic Retrieval Service's BRS/After Dark and Information Access Corporation's Search Helper, which offer considerably different approaches to end user searching.

The principal research questions of this study are the following:

1. What demands do end user systems place on library staff? How much assistance is required and what type of help is needed?
2. How satisfied are patrons with such systems? How easy are the systems for them to use? Are they content with the results?
3. What are the costs to the library, aside from staff time, for providing access to such systems?

The investigators received a General Electric Foundation grant from ARL/OMS and additional support from the Texas A&M University Library to conduct this project, which ran from February to May, 1984. The ARL/OMS funds were spent by April 23 and the Library provided additional funding to continue the project until the end of the Spring semester on May 19, 1984. The budget for the project is summarized in Table 1.

Table 1
Project Budget

Texas A&M Contributions:	
Equipment usage	$2000.00
Additional computer time (April 23-May 10, 1984)	451.47
Staff (.3 FTE for 6 months)	7500.00
Consumable supplies	75.00
GE/ARL/OMS Grant:	
IAC/Search Helper	2000.00
BRS/After Dark	2000.00
TOTAL BUDGET	$14,026.47

The investigators chose to compare BRS/After Dark and IAC Search Helper because of their considerably different approaches to user conducted searching. After Dark is a fully interactive interface which offers access to over 30 of the regular BRS databases (including CHEM, BIOL, ERIC, PSYC, CAIN, NTIS, and others) during off-peak hours (after 6 p.m. weekdays and all day on weekends). Average connect time rates are typically a fourth to a third that of normal daytime rates, ranging from $6.00 per hour on ERIC to $20.00 on Social Sciences Citation Index (SSCI). The system utilizes a simplified command structure, allows only online printing, and lacks some of the more sophisticated embellishments of the regular BRS system.

After Dark was chosen over DIALOG's Knowledge Index for a number of reasons. First, After Dark offered a larger number of databases at a lower average cost; Knowledge Index charges a flat $24 per hour compared to After Dark's variable charges of from $6 to $20 per hour. At the time the choice of vendors was made, After Dark offered databases such as CHEM and BIOL which Knowledge Index did not; these were files which the investigators felt would be of particular interest to the users at Texas A&M. Finally, DIALOG's policy required payment for Knowledge Index usage only by credit card, an administrative hurdle which the investigators were unable to overcome.

The equipment utilized for After Dark included a DECwriter printer driven by an IBM 3101 terminal, which had been purchased initially for conducting legal searches. The IBM terminal proved to be rather user unfriendly at first, but staff and library patrons learned to adapt fairly quickly to its idiosyncracies. Due to local telecommunications problems at the beginning of the data collection period, the After Dark service was initially offered at 300 baud. The slow speed caused considerable frustration and dissatisfaction for both library staff and patrons. Later a 1200 baud modem was made available, which provided a cost savings and an increase in patron satisfaction.

In comparison, IAC Search Helper is a microcomputer based system which prompts the user through the formulation of a simple search request. Once the request has been formulated, the equipment then automatically dials DIALOG, signs onto the system, conducts the search, downloads the information retrieved, signs off, and prints out the most recent citations. During the main portion of the project, the equipment on which the program ran was a Commodore VIC 20, and output was limited to the first 15 citations retrieved. Now a much more sophisticated version of the program has been developed which runs on an Eagle microcomputer and allows the user to print out citations in groups of 20 at a time. The databases available through Search Helper are Magazine Index, Legal Resources Index, Trade & Industry Index, Newsearch, Management Contents, and National Newspaper Index. Unlike After Dark, Search Helper is offered during all the hours of regular DIALOG operation. Search Helper charges are $2.50 per search, regardless whether the search retrieves any citations. Unfortunately, the rigid logic used in the microcomputer's program resulted in a great number of searches which netted zero results, thereby necessitating that users reenter their search terms a number of times in order to produce a workable result.

During the Fall semester of 1983, the investigators learned the systems, developed questionnaires for both users and staff, prepared at-the-terminal reference guides in the form of flipcharts, search planners, and other items for use with patrons and staff. In January, 1984, Reference staff were given training on both systems and were instructed on procedures to follow during the data collection period. Other than posters in the reference area of the library, no official publicity was prepared, the desire being to avoid as much as possible a sudden surge of use which would prejudice the results in regard to the day-to-day impact such services would have on library operations.

Data collection began in February, 1984, and continued through the end of the semester in May. The service was offered Monday through Thursday 6 p.m. to 9 p.m. and on Saturdays from 9 a.m. to 5 p.m. Each user was restricted to two sessions per day and a maximum usage of two days per week on either system. An After Dark session was defined as 15 minutes online and a Search Helper session was defined as a search resulting in at least one citation. No formal instruction program was offered to users, but staff were trained sufficiently to provide on-demand assistance throughout the sessions.

Data were collected from both users and staff. Users were required to complete a questionnaire each time they conducted a search, providing information regarding major, academic classification, level of experience with information resources, and their experience during the search. Staff also completed a questionnaire on each search, reporting database statistics, the amount and type of assistance provided to the user, and perceptions of the users' session. These staff questionnaires were labelled so that correlations between staff perceptions and user perceptions of the same

session can be established. Costs were calculated from staff reports and from the invoices provided by BRS and IAC.

USER RESULTS

The end users of the systems were not drawn from a target population. They were people who found out from their friends, library staff, or the announcement posted in the Reference area. Because of our concern that there would be far more demand than could be met, announcement of the service was limited to the "Library Do-It-Yourselfer" poster. Even with this very limited publicity, people waited in line most of the time it was available. A total of 260 users searched on the BRS/After Dark system. Of these, 56% were graduate students, 29% juniors and seniors, 8% faculty and staff, 7% freshmen and sophomores. A total of 126 people used Search Helper. Of the Search Helper users, 50% were juniors and seniors, 24% freshmen and sophomores, 19% graduate students, and 7% faculty and staff. 34% of the After Dark users were from the College Agriculture and 34% of the Search Helper users were from the College of Business. The remainder of the users represented all colleges within the University.

Information was gathered from the participants regarding their experience with library services. There was little difference in the library experience of After Dark and Search Helper users. Table 2 displays the percentage of end users of the two services who reported previous use of certain library services as well as their experience with computers. It is interesting to note that nearly as many users said that they had used microcomputers as the number who had used printed indexes. Possible correlations between users' library and/or computer experiences and their perceived success with the systems have not yet been determined.

Table 2

End Users' Experience with
Library Services and Computers

	After Dark	Search Helper
Printed Indexes	75%	79%
Online Retrieval Services	24%	18%
Online Catalog	37%	38%
OCLC	12%	14%
Government Documents	39%	40%
Microtext Department	63%	65%
Learning Resources Department	24%	33%
Microcomputers	65%	67%
Mainframe Computers	44%	40%
Own a Microcomputer	15%	13%

Even though the waiting lines were long, there was considerable repeat use of the systems. 42% (108 of 260 users) returned for

additional use of After Dark. Of the After Dark repeaters, fifty-five returned once, twenty-five returned twice, eighteen returned three to five times, and ten returned six or more times. 26% (33 of 126 users) returned for additional use of Search Helper. Of the Search Helper repeaters, seventeen returned once, nine returned twice, and seven returned three to five times. Thirty-four people used both BRS/After Dark and Search Helper.

The most popular databases on After Dark were AGRICOLA and BIOSIS. The "Magazines" file was the most heavily used Search Helper database. Table 3 lists the databases which were most frequently searched.

Table 3

Databases Searched

BRS/AFTER DARK — 545 sessions	
Sciences/Medicine	
AGRICOLA	149
BIOSIS	113
Chemical Abstracts	70
NTIS	49
Social Sciences/Humanities	
PsychInfo	55
Social Sciences Citation Index	41
PAIS	21
Business/Financial	
ABI/Inform	31
Management Contents	31
Education	
ERIC	49
SEARCH HELPER — 184 sessions	
Magazines	100
Newspapers	51
Recent Arrivals	48
Business Journals	37
Management Journals	35

Comparative end user search results are shown in Table 4. Even though the advertised cost for using Search Helper is $2.50 per search, the actual cost for a successful session is considerably higher. Because of the rigid logic of the system, a user can't recover from as little as a misspelled word once the return key is touched without doing another search for another $2.50. It was virtually impossible to monitor the number of searches actually done. The staff tried to record unsuccessful attempts and known searches, but the figures are not precise. The invoices for Search Helper use included 22% more billed searches than the number

indicated by our records. The new version of Search Helper permits use of tokens--one per search--which should be very helpful in monitoring the actual cost of the system.

Table 4

End User Search Results

	After Dark (545 sessions)	Search Helper (184 sessions)
Average Number of References/Session	31	12
Relevant References	60%	63%
Average Cost/Session	$3.55	$7.74
Average Connect Time	19.5 min.	NA

On the evaluation forms the users were asked to check, from a list of possible problems, ones with which they experienced difficulty. Table 5 lists these and the frequency of responses for each problem.

Table 5

Problems Indicated by End Users

BRS/After Dark	
Entering Terms	63
Connecting Terms	55
Printing Citations	43
System Prompts	42
Error Messages	28
Database Menu	18
Search Helper	
Entering Terms	13
Printing Citations	7
Database Menu	4
System Prompts	1
Error Messages	1

At the end of each search session, the users were also asked to rate, on a scale from one (easy) to five (difficult), five aspects of the search process. The average end user ratings are listed in Table 6.

Table 6

End User Ratings

	After Dark	Search Helper
Operating the Terminal	1.5	1.2
Choosing an Appropriate Database	1.4	1.5
Choosing Appropriate Keywords	2.0	1.7
Using Logical Connectors	1.9	NA
Making the Search More Specific	2.2	NA

The ratings of the repeat users' subsequent searches were isolated. Generally, the greatest change in perceived ease occurred in "Using Logical Connectors" and "Making the Search More Specific" as the average rating dropped by 0.3 to 1.6 and 1.9, respectively.

The users were asked to rate their overall satisfaction with each search session. A scale from one (very satisfied) to five (very dissatisfied) was used. The average response to overall satisfaction with BRS/After Dark searches was 1.9; the average response with Search Helper sessions was 1.8. In isolating the responses of the repeat users, the average response was 0.2 lower. This improvement in overall satisfaction with repeat use parallels the increased ease in the various aspects of the search process as indicated by the repeat users.

Many of the end users made additional comments which were generally very positive. Their enthusiasm for the "Do-It-Yourself" service was evident from the written comments, the many verbal comments made to members of the staff, and the willingness of so many to return and wait in the queue for another session. Comments were frequently directed at the fifteen minute time limit; everyone wanted a longer period. In effect, we operated with a very generous fifteen minutes, the proof of which is the average connect time of more than nineteen minutes for all BRS/After Dark sessions. Several of the users stated that it would be useful to have more instruction and more time to get acquainted with the systems before actually using them. They proposed various methods: classes, short courses, more detailed manuals, more individual guidance in developing search strategies and selecting keywords. There was a definite expression of a desire by some of the end users for specific instruction and additional experience in order to make their searching more beneficial.

STAFF INVOLVEMENT

No library program, regardless how user friendly it may be, is ever implemented without staff effort. A major element in the design of this project, therefore, was to assess the impact of the

end user operated literature searching systems on staff resources. The investigators felt that the introduction of any new service into a library's program could create a significant new demand on staff time; so the research design was structured in such a way as to minimize any disproportionate demands on staff that a new service might produce. To that end, the investigators chose to do no campuswide publicity of the service, but rather, to treat After Dark and Search Helper as if they were systems that were long-established parts of the library's reference service.

Publicity of the service was limited to a single-page "Library Do-It-Yourselfer" flyer which was posted in the Reference area and made available in multiple copies at the desk. No introductory lectures or other instructional sessions were given by staff members. With the potential adverse impacts of a new service thus minimized, the investigators hoped to measure the effects such services can be expected to have on reference staff on a continuing basis--that is, after the "new" wears off.

In order to gather this information, a second form was designed to collect staff data. It contained a short log for recording logon and logoff times and blanks for other information necessary for queuing users during each evening the service was offered. In addition, staff were asked to record how much time they spent helping users during the course of their sessions (pre-search to post-search interactions), how many times they were required to help during the search, and the nature of the assistance which they provided. Finally, they were asked to respond on Likert scales to four questions assessing each user's performance.

Reference staff, both professional and non-professional, performed three functions during the data collection period. As traffic controllers, they handed out search request forms and maintained the queue of users each evening. As technicians, they were responsible for logging patrons on to the After Dark system, maintaining session statistics, and resolving any equipment problems. As consultants, they advised users about choosing appropriate databases, drafting effective search strategies, and correcting problems that occurred during search sessions.

At the outset of the data collection period, the investigators asked reference staff to handle the details of the end user sessions just as all other requests coming to the desk. Because of problems arising from the physical arrangement of equipment in the Reference area and because of the heavy patron load on weekday evenings, this arrangement proved very quickly to be unsatisfactory. Therefore, by March staff assignments were adjusted in order to have one person stationed in the computer terminal area on evenings when the services were made available. This arrangement proved to be much more satisfactory both in reducing staff frustration and in providing timely assistance to patrons.

During the data collection period, staff members completed 523 forms for After Dark Searches and 184 forms for Search Helper sessions. Total staff time requirements recorded on these forms were 40.40 hours for After Dark (average of 4.64 minutes/session) and 8.35 hours for Search Helper (average of 2.72 minutes/session). Staff were required to provide assistance 1298 times during After Dark sessions (1.6 times/session) and 255 times during Search Helper sessions (0.9 times/session). Tables 7 and 8 summarize the types of assistance to patrons that were reported by the staff for each of the systems.

Table 7

Types of Staff Assistance
Required During After Dark Sessions

	Frequency	Percentage
Choice of Database	137	10.6
Topic	132	10.2
Machine Operation	286	22.0
Boolean Logic	286	22.0
System Commands	341	26.3
Logoff	75	5.8
Other (Unspecified)	41	3.2

Table 8

Types of Staff Assistance
Required During Search Helper Sessions

	Frequency	Percentage
Choice of Database	56	22.0
Topic	64	25.1
Machine Operation	73	28.6
System Commands	43	16.9
Other (Unspecified)	19	7.5

Staff were also encouraged to provide additional comments regarding search sessions. Among the 282 volunteered comments on staff forms, the greatest number related to equipment and system problems. Among the other comments, several themes emerged. For example, a significant number of patrons were, the staff felt, unable or unwilling to follow system instructions or in fact wanted the staff to do all the work for them. In contrast, the staff also had to deal with a number of overenthusiastic searchers, who, having done their own search, then proceeded to advise others (frequently badly). In most instances, however, staff indicated that end users were quite capable of dealing with the systems after a minimal amount of experience. The fully interactive capabilities of the

After Dark system appear, however, to have made those sessions somewhat more fruitful per dollar invested than the Search Helper system.

Based on the experience gained in the project, the investigators have tentatively concluded that library patrons can successfully use both of the literature searching systems tested. It seems clear that although the services will require staff to be actively involved in their administration, the level of staff required to provide adequate service is not out of the range of possibility for at least moderately staffed libraries. More work needs to be done, however, on the best methods of providing users with pre-search experiences, some of which may also help reduce the requirements for staff intervention.